THE
# ELECTRICAL REVIEW

**Volume CXXIX** **No. 3330**

**Friday, September 19, 1941**

## Contents


| | Page | | Page |
|---|---|---|---|
| Editorial—Control of Industry | 253 | Lease-Lend Supplies | 272 |
| Electrical Precipitation | 255 | Commerce and Industry | 273 |
| Personal and Social | 260 | Electricity Supply | 277 |
| Correspondence | 261 | Water Power in Scotland | 278 |
| Earthing in Factories. By "Rotor" | 263 | Financial Section | 279 |
| Modern Factory Installation | 266 | New Patents | 284 |
| Communal Feeding | 267 | Contract Information | 285 |
| Warming Surface Shelters | 270 | Modern Fire Protection | 286 |
| Classified Advertisements | 63 | Index to Advertisers | 74 |


**EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1**

Telegraphic Address: "Ageekay, Sedist, London." Code: A B C. Telephone No.: Waterloo 3333 (35 lines)
Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.
Subscription Rates, Postage free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d.; Colonial and Foreign, £1 14s. 8d. per annum.
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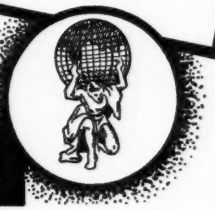

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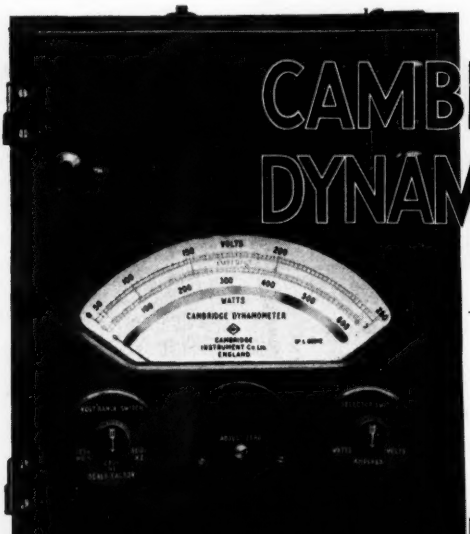


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THE
# ELECTRICAL REVIEW
THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXIX. No. 3330. SEPTEMBER 19, 1941 6d. WEEKLY

# Control of Industry

## *Pointers to Future Policy*

IT is probable that the majority of those concerned with the direction and management of industry feel that any form of Government control is irksome and not conducive to efficiency and progress.

They will admit that under the stress of modern war Government must assume complete direction to ensure that essential products are turned out in sufficient quantities in the shortest possible time. Whether that aim is always achieved may sometimes be questioned, but it is quite certain that the peacetime industrial system is not easily adapted to wartime conditions and must undergo drastic change which only an overriding outside authority can bring about.

But, having agreed to the inevitability of control, most industrialists look forward to the time when they will be able once again to resume their normal activities free from too much Government interference. Few, however, can be so sanguine as to imagine that this freedom will return with the signature of a peace treaty. Violent as the conversion to war production may have been it is as nothing compared with the change-over which will follow the war if concerns with vastly increased productive resources are allowed to scramble for business in an impoverished world.

A sudden release of the Government grip upon industry would result in chaos and Cabinet Ministers have rightly warned the nation that control of industry must persist for some time after the war.

But will things ever be the same again? Is it desirable that they should be? Nobody will contend that the pre-war system was perfect. Even in the electrical industry, where there was more room for development than in most, it was felt that conditions were becoming a little too crowded in some directions: that too many people were persuaded by the general prosperity of the industry to believe that there was easy money in everything electrical.

That this was realised by the industry was becoming apparent in such symptoms as the Fair Trading Policy and the movement for the compulsory registration of electrical contractors, which were designed as much as anything to keep undesirable intruders from skimming as much cream as possible from the industry before proceeding to the Bankruptcy Court.

This subject of contractors' registration is dealt with in a report by the Donkin Committee which we hope will soon be available. In the meantime it is thought in some quarters that the recent Order requiring firms in the building and civil engineering contracting industries to register with the Ministry of Works and Buildings may be a pointer to future policy. The Order stipulates that firms which have not registered by a certain date will not be allowed to carry on business after October 1st. Apparently the capability of an individual firm to conduct a business in the industries concerned is to be judged by the Ministry, but the only qualification demanded by the Order appears to be the observance of certain conditions of labour.

We have used the word " only " although in fact there is more in the stipulation than there may seem to be. It is notorious that undercutting in industry is achieved largely by the use of cheap or " sweated " labour and the prevention of this is a long step towards cleaning up unsatisfactory industrial conditions. With labour at a premium there seems to be less point in this at present than there is likely to be in the future when the labour market will be flooded. That is why some people discern in the Order the shape of things to come—a possibility that the number of concerns operating in any industry will be limited to the actual needs.

**Mobile Power Stations**

IN order to provide against emergencies at its shore establishments, the United States Navy contemplates ordering two 10,000-kW mobile generating units (one for each Ocean coast) at a cost of $2.5 million. The plant, it is stated in the *Electrical World* would be installed in four railway wagons, one for the oil-fired boilers, operating at 600 lb. per sq. in. and 750 deg. F., another for the turbo-alternator, a third for switchgear (up to 13 kV) and a fourth for fuel. Attractive as the idea of thus bringing reserve generating stations into commission by rail may be, conditions in Great Britain make it much more feasible to send power by high-voltage lines to emergency substations.

**Export Trade**

IT is extremely unfortunate that after so much time and effort have been devoted to an export drive we should have to be told that little can now be done in the matter of overseas trade. But, of course, circumstances have drastically changed during the past eighteen months or so. Our primary aim in keeping exports at as high a level as possible was to secure dollars to pay for the enormous purchases which we were having to make in the United States The passing of the " Lease and Lend " measures substantially reduced this need and, indeed, made it desirable that we should not appear to be able to dispose of goods abroad while seeking all possible assistance from our American friends. The matter was the subject of statements made last week by Mr. Eden and Mr. F. D'Arcy Cooper, of the Industrial and Export Council. These will have to receive very close attention from concerns who rely largely on export trade in normal times and who must consider means for keeping open the lines of communication.

**Water Power**

THOSE who hope for a material reduction in the cost of electricity through the development of water power resources may be reminded that a Government Committee, with the late Sir John Snell as chairman, reported on the subject twenty years ago. Commercially practicable projects, it was estimated, would develop only 210,000 kW throughout the years. Actually, peak loads of nearly half as much again are now being met by companies owning hydro-electric stations, but with a kWh output considerably under half the maximum possible, a large proportion of the additional kW being provided by stations that were not designed for continuous full-load working. As water-power stations are now responsible for less than 5 per cent. of the total output of generating stations, they are unlikely to bring appreciable benefits to ordinary consumers in this country.

**Glen Affric**

LAST week the House of Commons decided not to allow the scheme of the Grampian Electricity Supply Co. for the development of water-power at Glens Affric and Cannich to proceed. Apart from the merits or demerits of the proposals, we cannot help feeling that the House, which is forced by present circumstances to approve so much, welcomed the opportunity of exercising its powers to say " nay." It was perhaps fortunate for the opponents of the scheme that it was not promoted by a Government Department.

**Making it Clear**

WAGE payments are nowadays complicated by numerous additions and deductions and many questions inevitably arise. Account has to be taken of income tax, National Health and Unemployment Insurance, apart from such voluntary deductions as National Savings contributions, Red Cross donations, etc. We wonder how many firms have adopted the sensible practice of Brook Motors, Ltd., and enclose a clear statement in their workers' wages packets. According to " The Brook " (the company's little magazine) all the employees now receive a printed slip with their wages, giving as far as practicable the various additions and deductions.

# Electrical Precipitation

## *A Promising Field for Development*

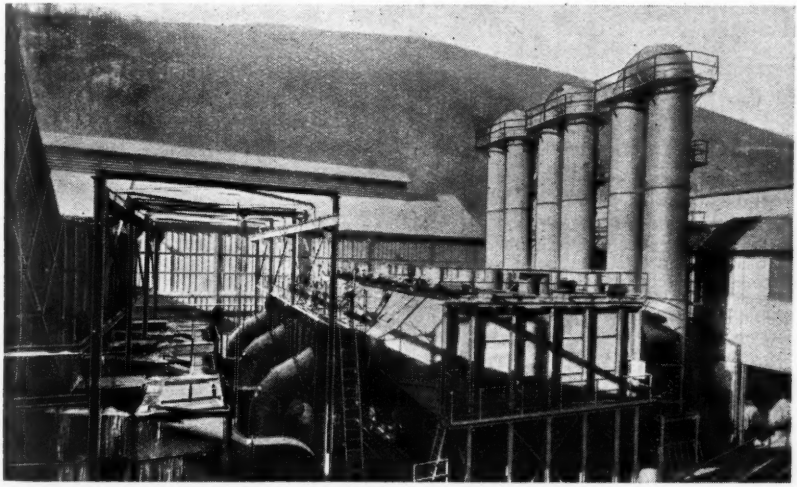
**Government regulations calculated to eliminate the nuisance caused by the issue of dirt-laden gases into the atmosphere are becoming more stringent and consequently the removal of the suspended matter is of increasing importance. In addition, the manufacturer himself may also benefit**

THE removal of solids suspended in industrial gases is becoming more and more important for a number of reasons. First, there is the nuisance to the public. In the manufacture of cement, large quantities of cement dust escape from the kiln and, unless arrested are issued from the stack to be precipitated naturally over the surrounding countryside. An average kiln will produce from fourteen to eighteen tons of clinker per hour, and as much as two to five tons of dust per hour may escape in this way.

Another reason is improvement of the product which is often possible as the result of the removal of suspended solids from the gases ; examples of this may be found in the manufacture of sulphuric acid. The gas is charged with particles of dust from the pyrites to the detriment of the product, and this can be satisfactorily removed by electrical precipitation. Again, the suspended matter itself often has industrial value. In the production of coal or water gas quantities of tar vapour are suspended in the gas as it leaves the retort, and in the subsequent cooling this vapour is converted into tar particles which can be removed by precipitation, thus yielding a valuable by-product. This alone often justifies the expense of installing and operating precipitation plant. Last, suspended solids often tend to foul a production plant so that their removal is advisable in the interests of efficient plant operation.

### Mechanical or Electrical ?

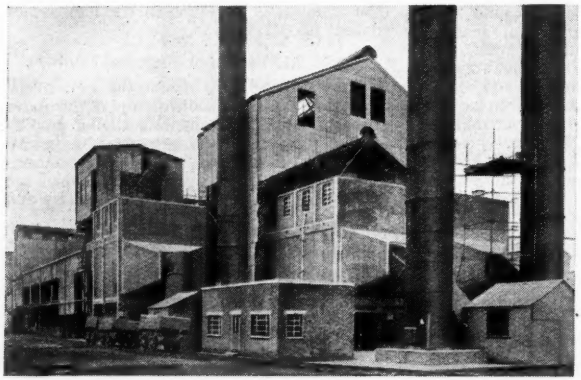
The first question to arise in the mind of the industrialist who is faced with any of the above problems is: "What method shall I employ for the removal of the suspended matter ?" We may broadly classify precipitation methods as electrical and mechanical, both of which are of close interest to the electrical industry and the choice rests on a number of considerations. Electrical precipitation is inherently much more efficient than the mechanical method so that where efficiencies as high as or higher than, say, 98 per cent. are required, the former method is essential.



**A comprehensive electrical precipitation plant associated with the aluminium industry**

This does not mean, however, that in all cases where a lower efficiency is sufficient that mechanical precipitation is indicated. Some particles such as those in fumes are too small to be dealt with mechanically. For example, in acid gases the particles are much too fine to yield to mechanical methods, and in general it may be said that where particles are below 5 microns in size, electrical precipitation is indicated. Then the volume of gas to be handled is often a deciding factor, for both the capital and running costs of the plant increase more rapidly in the case of mechanical precipitation than with electrical precipitation.

In cement or aluminium production volumes of gases as great as 50,000 to 100,000 cu. ft. per minute with a dust burden of as much as 20 grains per cu. ft. have to be dealt with, and mechanical plant to deal with such volumes and dust burdens at the required efficiency of 96 to 98 per cent. are difficult to construct. Further, beyond a certain point mechanical precipitation becomes too expensive.



**Horizontal plant: Three precipitators handling 200,000 cu. ft. of gas per minute at a cement works**

It will be obvious from the foregoing considerations that so far only the fringe of the development field of electrical precipitation has been touched, and that many industrial applications such as the following still remain to be developed: alcohol recovery, oil purification, mineral grading, classification of ground products, and classification of products in chemical processes.

### An Obstacle to Advancement

One of the obstacles to the greater advancement of electrical precipitation is the relative greater cost of the smaller plant. This is largely due to the fact that so far the electrical equipment available for precipitation plants has been of one standard construction, so that its cost as a proportion of the plant as a whole is greater in the case of the smaller installation.

No doubt this peculiarity is bound up with the necessity to have the electrical machinery of sufficient capacity to prevent wave distortion and provide efficient insulation above earth in the electricity supply to the precipitator proper as insurance against breakdown consequent on overload at high potential, but conservatism seems also to have played a part in this somewhat cramping deterrent.

We are assured, however, that smaller electrical plant has now been developed for the lower gas volumes. We refer to an acid mist plant, which has to handle a gas volume as low as 1,000 cu. ft. per minute. The cost of the electrical equipment is as low as about £250, whereas the cost of the electrical equipment for the average precipitation plant is of the order of £1,000. This reduction has been accomplished by the use of a thermionic valve rectifier in place of the usual rotary rectifier.

A further development is the use of a smaller rotary rectifier, so that the equipment can be produced at about the same cost, namely £220, but it is essential to remember that this only applies to small gas volumes of from 500 to 3,000 cu. ft. per minute. All this is bound up with the question of the distances between the electrodes and the applied voltage for actual precipitation. For greater spacings higher voltages are necessary, but with the larger gas volumes and higher dust burdens of the gases it is essential to have comparatively large spacings. In the case of the smaller volumes and lower dust burdens of the gases, however, smaller spacings, and hence, lower voltages, are possible, and it is by the reduction of the voltage that the use of simpler and less costly electrical equipment is effectively possible.

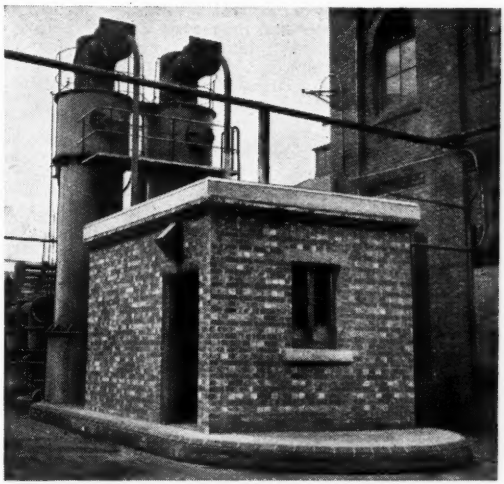
### General Principles

Electrical precipitation is closely related to the phenomena of ionisation, the process by which atoms and particles of matter are split into positively and negatively charged particles or positively charged particles (ions) and electrons. Through the processes of polarisation and ionisation, corona current flow is set up and it is this corona current which is the absolute keynote to the actual process of precipitation proper.

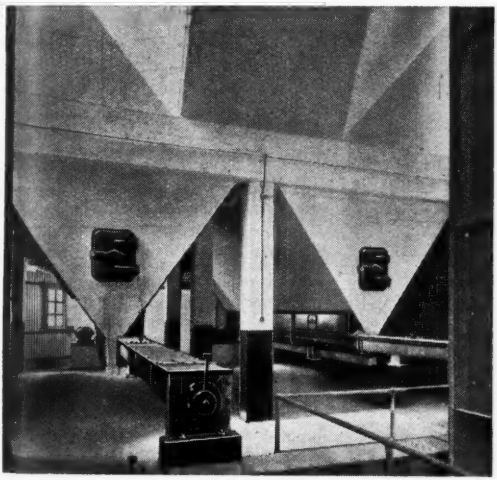
With this picture of ionisation and corona current flow in mind, we may think in terms of the dust particles being acted upon directly by the corona current, and then we are brought

face to face with such problems as the velocity of the particles, which varies with their size and nature and has a very considerable influence on design features. We may sum up the situation by stating that the electrical precipitation of conductive particles depends upon the intensity of the electric field, the quantity of gas, the temperature of the gas, the degree of initial ionisation and the type of corona discharge employed.

Another point of vital interest is the close association between corona current flow and point discharge, and on this rests a determining design factor, namely, the smallest practicable discharge area for the negative electrode. In consequence the negative electrodes of practically all precipitation plants are in the form of comparatively fine wires, whereas the positive or collecting electrodes have large areas and take the form of plates or tubes arranged concentrically around or parallel with, and adjacent to, the negative electrodes according to the type of precipitation plant designed for particular applications.



**Vertical plant: An 8,000,000-cu.-ft.-per-day detarring installation at a large gasworks, showing the electrical equipment house**



**Collecting hoppers and screw conveyor of a horizontal plant**

Test figures show that negative corona precipitates about 95 to 99.9 per cent. of the suspended matter, positive corona about 70 to 80 per cent. and alternating corona about 50 per cent. Apart from its low efficiency, however, alternating corona is a very doubtful proposition because if the polarity of the electrodes is too rapidly reversed, as in the case of AC supply, the particles may remain in suspension in the gases unless by repeated collision they become of sufficient aggregate size to enable them to fall under gravity, in accordance with an earlier principle of electrical precipitation.

We have shown that the negative or discharge electrodes have a surface as small as possible in order to obtain the maximum corona discharge and that the positive or collecting electrodes have a comparatively large area so as to afford the maximum surface for the collection of the particles and the dissipation of their charge. The negative wires are suspended equidistantly between the precipitation plates or tubes in order that the corona flow may be as uniform as possible, an essential feature to efficient working.

From the foregoing it will be obvious that

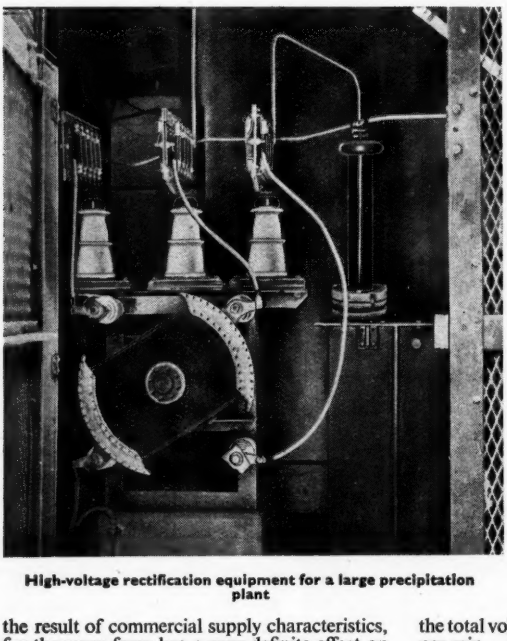
two vital features of the supply system are very high voltage and unidirectional current. In most cases, of course, the initial supply is AC and, as in the majority of cases, rotary rectification is the best proposition on the score of simplicity. The complete electrical installation consists of a motor-generator rectifier set, a high-voltage step-up transformer (50,000 to 100,000 V) with the necessary switchboard instruments.

### Rectification Methods

The mercury rectifier, the hot-cathode-ray tube, the high-voltage DC generator afford other methods of rectification, but the mechanical rectifier offers outstanding advantages over all these by way of extreme simplicity, ease of adjustment, ease of maintenance, low initial cost and, above all, its intermittent characteristic which tends to suppress electrode short circuits resulting from the building up of dust collections, and its assistance in the maintenance of the applied voltage.

It is of outstanding importance that the electrical machinery should be of sufficiently large capacity to prevent wave distortion as the result of commercial supply characteristics, for the wave form has a very definite effect on the efficiency of the precipitation. While the outputs of various electrical installations for precipitation plants vary widely with the sizes of the plants, in terms of normal electricity supply these outputs are very small indeed and for this reason it is rarely worth while commercially to vary the sizes of the equipment except for very small gas volumes to which we have already referred. Thus, for the gas volumes normally treated, say, about 25,000 cu. ft. per minute, the electrical equipments have become standardised to one size, which it is customary to designate in terms of the applied voltage rather than the capacity of the plant.

Sixty thousand volts seems to be the maximum required for the gas volumes handled in this country, so that practically all the machines available are designed for this maximum voltage and voltage adjustment for smaller gas volumes is arranged for by tappings on the step-up transformers.



**High-voltage rectification equipment for a large precipitation plant**

### Horizontal or Vertical Plant?

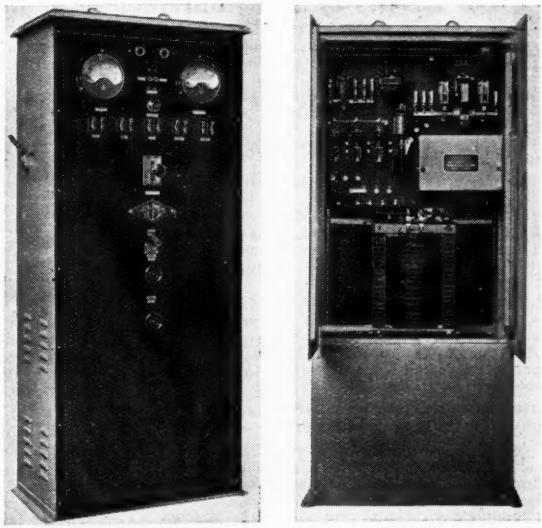
We have already referred to the two types of electrode systems, that is, the plate and wire and the tube and wire types, which are generally associated with the horizontal and vertically disposed housings, respectively, in terms of the direction of gas flow. One of the essentials of good precipitation is uniform gas distribution, and generally it may be said that it is easier to get good distribution of large gas volumes by the horizontal flow construction than by the vertical method, and where volumes are of the order of 60,000 cu. ft. per minute or more, horizontal plant is usually advocated.

Further, the vertical construction is somewhat more expensive, but it is often justified where ground space is lacking or very valuable. The vertical construction is, however, sometimes essential to the actual process. For instance, in the precipitation of tar, it is a particularly convenient method for the collected tar particles to flow in the aggregate as a fluid down the surface of the tube.

In a large gasworks the tar precipitator has to deal with a gas volume of 72,000 cu. ft. per min., and the cylindrical housing is about 6 ft. in diameter and 24 ft. high. The three horizontal precipitators for dealing with the dust-laden gases from the cement kilns at an Oxford works have concrete housings each measuring 40 ft. long by 27 ft. by 36 ft., and the total volume to be dealt with is 200,000 cu. ft. per min. Where the gas temperatures are low and are likely to reach a figure below the dew point at any time, a concrete structure is advisable in order to guard against corrosion. Sometimes weight is the deciding factor. For

instance, precipitation plant may have to be erected on the roof of the building and then the steel structure is likely to offer the best arrangement in the interests of weight reduction. Sometimes cost is an influence.

We have already referred to the influence of the velocity of the gas stream on various other aspects of precipitation, and generally the matter may be summarised as follows: The velocity of the gas stream must be restricted to a rate which will harmonise with the lateral velocity of the electrically charged particles, it being appreciated, of course, that this is very closely bound up with spacings, voltages and gas volumes. Another factor which governs the whole question of design and operation is the gas temperature. It is quite impossible to name any one temperature as an optimum value because the initial temperatures are so extremely varied and it may be anything between, say, 200 deg. F. and 1,000 or more deg. F. Further, it is possible to precipitate one solid at a high temperature and others at a low temperature in the same gas stream. But above all these considerations in importance is the fact that no one temperature has any deciding influence on the various aspects alone. It can only be considered in conjunction with all the other factors, velocity, volume, temperature and so on.



**Exterior and interior of control cubicle for electrical installation**

### Gas Conditioning

Because of the necessity to have conductive particles in order to effect satisfactory precipitation in consequence of the fundamentals of ionisation and polarisation, gas conditioning sometimes becomes necessary, that is, it is necessary to convert particles into conductive ones. For instance, a gas stream without sufficient $SO_3$ is non-conductive and in order to convert it to a conductive one acidifying or humidifying is necessary. To create a full appreciation of this, it should not be necesary to point beyond the vastly different particle characteristics of dust and fume.

One of the biggest problems of the precipitation plant designer is the elimination of vibration which may be caused by unbalanced electrostatic pauses, drawing the discharge electrode towards the collected electrode. This problem is very closely bound up with the aspects of precipitation voltage and spacing, and as a general guide it may be said that at 25,000 V vibration is negligible, at 50,000 V it may seriously interfere with the operation, and at 100,000 V it is impracticable unless the discharge electrodes are perfectly non-rigid.

In this article we have dealt exclusively with electrostatic precipitation of dust from gases without consideration of more recent developments such as thermal precipitation, in which the corona effect is produced by the electric field associated with a high temperature conductor, nor of the precipitation of impurities from liquids, it being considered that these later developments have not reached a stage which would justify their inclusion in a review of well-tried and proved applications of commercial value.

We are indebted to W. C. Holmes & Co., Ltd., for facilities to view some of the plants referred to in this article and to Messrs. E. M. Lake and W. Sykes of that Company, who have helped us considerably in compiling the foregoing notes.

## New Use for Washboilers

THE use of washboilers for home sterilisation of bottled fruit is suggested in the September issue of *Cheerful Rationing*, published by the Electrical Association for Women. It is necessary to put in a few slats of wood at the bottom to keep the bottles away from the elements, and after well covering the bottles with cold water the boiler is switched on to half heat, slowly raising the temperature of the water from a " slow simmer " at 165 deg. F. up to a " good simmer " at about 190 deg. F.

# PERSONAL and SOCIAL

## *News of Men and Women of the Industry*

AMONG the members of a committee set up by the Secretary for Mines to advise on technical aspects of efficiency and economy in industrial fuel consumption are **Dr. F. S. Sinnatt,** director of fuel research, Department of Scientific and Industrial Research, and **Mr. Johnstone Wright,** chief engineer to the Central Electricity Board.

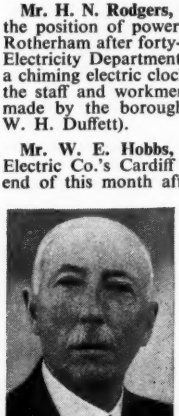
**Mr. A. W. Hiley,** who for many years has been with Veritys, Ltd., and has been prominent on the sales side in the North and Midlands, and **Mr. W. G. Pipkin,** who has been manager of the company's Birmingham works for many years, have been elected additional directors of the company.

**Mr. A. Nichols Moore,** M.I.E.E., M.I.Mech.E., borough electrical engineer of Newport (Mon.) will shortly reach the retiring age. The Electricity and Transport Committee, however, recommends that his services shall be retained until February 19th, 1943.

**Mr. J. T. Becklake,** A.M.I.E.E., has been appointed Director of the South African Mint.

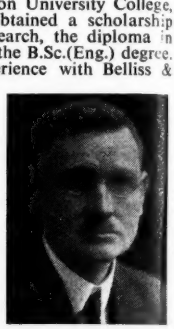
**Mr. H. N. Rodgers,** who recently retired from the position of power station superintendent at Rotherham after forty-one years' service with the Electricity Department, has been presented with a chiming electric clock and an electric fire from the staff and workmen. The presentation was made by the borough electrical engineer (Mr. W. H. Duffett).

**Mr. W. E. Hobbs,** manager of the General Electric Co.'s Cardiff branch, is retiring at the end of this month after completing forty-seven years' service with the company. On joining the G.E.C. in 1894, he served some time in the accounts department in London and at the Birmingham branch, being appointed manager of the Cardiff branch in 1902, in succession to the late Mr. W. B. Phelp. During his time at Cardiff Mr. Hobbs has seen the expansion of the company's business in South Wales and the West of England, and the opening of new branches at Bristol, Swansea, and finally at Gloucester, all of which came under his control. In addition to being a Companion of the I.E.E., he is a member of the South Wales Institute of Engineers, was president of the Publicity Club of Cardiff in 1936/37, a co-opted member of the Development Committee of the Cardiff City Council, a founder-member of the Cardiff Rotary Club, and for many years a member of the committee of management of the E.I.B.A.



**Mr. W. E. Hobbs**

In our August 29th issue we reported the resignation, for reasons of health, of **Mr. D. H. Bishop,** B.Sc.(Eng.), M.I.E.E., general manager and engineer of the Dundee Corporation Electricity Department. Mr. Bishop, who is a native of Lichfield, was educated at Queen Mary's School, Walsall, and Mason University College, Birmingham, where he obtained a scholarship for a year of original research, the diploma in electrical engineering, and the B.Sc.(Eng.) degree. He gained practical experience with Belliss & Morcom, Ltd., and in 1901 joined the Dundee undertaking as a switchboard attendant. Subsequently he was placed in charge of the meter test room and consumers' department, later became shift engineer, and in 1907 was promoted to take charge of the development department, his work being then, under Major H. Richardson, M.I.E.E., to prepare designs and specifications and take charge of the construction of the new generating station. In 1922, Mr. Bishop succeeded Major Richardson as general manager and engineer. He is a past chairman of the Scottish Centre of the Institution of Electrical Engineers.



**Mr. D. H. Bishop**

**Miss Margaret Nelson,** the only daughter of Mr. G. H. Nelson, chairman and managing director of the English Electric Co., Ltd , was married on September 13th to **Mr. E. M. Price.** the youngest son of Mr. Bernard Price, O.B.E., M.I.E.E., a director of the Victoria Falls & Transvaal Power Co. Mr. E. M. Price is an engineer with the English Electric Co.

## Obituary

**Mr. J. Garnett.**—We regret to learn of the death at the age of 77, on September 9th, of Mr. James Garnett, a pioneer in electrical installation work, particularly in country houses. Apprenticed originally to clock-making with Dent's, he joined the Edison Swan Co. and claimed to have made one of the first tumbler switches. He was with Edmundson's Electricity Corporation from 1890 to 1920 and became their chief inspector of private house installations. In 1920, Mr. Garnett joined Read & Partners, Ltd., and was engaged as supervising engineer on work in country houses and public buildings. He was among the first members of the Association of Supervising Electrical Engineers.

**Mr. H. A. Green.**—The death is reported of Mr. Henry A. Green, managing director of Murex, Ltd., with whom he had been connected for over thirty years. He was responsible for a number of notable metallurgical developments.

**Mr. Francis L. Bland,** of Copdock, Ipswich, whose death is announced at the age of sixty-eight, was a director of the East Anglian Electric Supply Co., Ltd.

# CORRESPONDENCE

*Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.*

## Reading Matter for the Blind

I HOPE that the proposal made by Mr. C. Turnbull in your issue of August 29th, will turn the minds of some of your readers to further devices for the benefit of the blind. Our own research work is continuous, and we are always most ready to consider suggestions either from blind or seeing inventors.

Mr. Turnbull's proposal is similar to several which we have had under consideration based on the assumption that Morse is quicker or easier for the blind to read than Braille. That is not in fact the case. We are advised that a good average speed of Morse reading is 40 words per minute. A good Braille-reader reads 200 to 250 words a minute. Many of the readers of your journal will have no doubt witnessed blind people reading Braille as fast as people with sight read letterpress. They will no doubt have observed also that a good Braille reader reads with both hands, *i.e.*, one hand is travelling ahead, getting the sense of the sentence as a whole, while the other is reading word by word. This double apprehension of the printed word is essential for proper accentuation of clauses and sentences, and is entirely analogous to the reading process of a sighted person.

The possibilities of the photo-electric cell have been investigated in several directions. Fournier d'Albe's "Optophone" used a selenium cell, and we have great hopes that the "talking book" for the blind, which is at present a gramophone disc, will be replaced before long by a film scanned by photo-electric cell. Any proposals for improving the methods of reading for the blind must take account of "talking books." The actual reproduction of the spoken word has obvious advantages over the reproduction of Morse or other sound-codes.

It is true that Braille in small editions is expensive to produce. Editions of most books are small because the blind reading public is comparatively small. On the other hand, this Institute publishes not fewer than twenty-three distinct periodical publications, some of which run to reasonably large circulations. In any case, all our Braille publications are "sold" to the blind at only a fraction of their cost, and Braille readers have a wide choice of reading matter. The main part of the cost of producing Braille is that of making the stereo plates from which copies are taken. An invention of great benefit to the blind would be one which materially reduced the cost of the plates; they are at present zinc plates, embossed by blind workers on electrically-operated "transcribing machines" of our own design. Another invention of great potential value would be the successful accomplishment of what the "Optophone" attempted but did not achieve in practical form, namely, the transformation of ordinary letterpress into sound.

We have a very competent Technical Research Committee at the National Insitute for the Blind, and we receive much valued help from scientists and technicians. Any new ideas put forward are most carefully considered by them, and proposals from any of your readers would be warmly welcomed.

*London, W.*1. W. McG. EAGAR,
*Secretary-General,*
National Institute for the Blind.

MR. TURNBULL'S letter has reopened a subject which engages the attention of the Press from time to time, namely, the assistance which electrical engineers may be able to accord to the blind in enabling them to read. His suggested method has the very great merits of inexpensiveness and portability and its success might reasonably be gauged by the facility known to be acquired by telegraph operators.

The objection to it, as already pointed out by Mr. Thorne Baker, is that, as for Braille, the master copy has got to be set in the "type" peculiar to the system. Would it be so very much more expensive to have books read in the language which all can understand, recorded as sound tracks on films, several tracks to be placed side by side as suggested by Mr. Turnbull for his Morse signs? The tired eyes of those gifted with quite good sight might conceivably lift the demand to a figure which would enable the same films to be made available to the blind at what would otherwise be an unattainably low cost.

One wonders why, with the powers now at our command, the instruments mentioned by Mr. Thorne Baker have not been taken a stage further to the production of a machine which will announce ordinary printed letters by enunciating the sounds generally associated with them, thereby building up something recognisably similar to the written word and frequently phonetically similar to the spoken word. Success in this direction would limit expenditure to the machine itself and would render the learning of any code unnecessary, a point of no small consideration to people who become blind late in life. A few years ago some young Russians were credited with the production of such a machine, but I have never seen details to suggest that their effort was a success.

Unfortunately the development alone of such a machine would be expensive and the eventual limited demand can hardly be expected to make it appear worth while to a business firm. That is why the speech-film extension of Mr. Turnbull's proposal appears so attractive. The fundamentals have already been developed and its possible use by those who are not blind, which seems amply justified by statistics recording the use of spectacles by young people discussed in a recent issue of *Nature*, at least enables a developable demand to be envisaged which would in turn enable the films to be made available to the blind at specially cheap rates.

*Dorking, Surrey.* FREDK. A. BARKER.

## Chief Engineers' Salaries

IN reply to Alderman Walker's letter in your issue of September 12th, I must disagree that my statements as to the percentage of chief engineers who are members of the A.M.E.E. are incorrect or that I have misquoted the minute. I would also state that the minutes in question are available to quite a number of chief engineers, apart from myself, and I wish that I were free to indicate the volume of support in the form of letters, etc., which other engineers, including members of the A.M.E.E. and the Joint Engineers' Committee, have given to some of my views.

The recorded statement in the minutes is as follows:—". . . the A.M.E.E. represented 88½ of the Chief Engineers *in undertakings of* 5 *million units and over*." Alderman Walker, in his letter of July 18th, stated that "he knows . . . that almost 90 per cent. of the chief engineers are represented on the Association—as the employers had to be satisfied regarding the standing of the Association."

Very well—according to the Commissioners' statistics there are 364 municipal undertakings of which 143 *have an output of less than* 5 *million units*, leaving 221 undertakings of 5 million units and over. Of this number (221) the A.M.E.E. claims that 88½ per cent., or 195 undertakings have chief engineers who are A.M.E.E. members, *i.e.*, this *is* the A.M.E.E. Thus, the A.M.E.E. statement recorded above shows quite clearly, without incorrectness or misquotation, that $\frac{195}{364}$, or 54 per cent. of the chief engineers of public authority undertakings are claimed by the A.M.E.E. as members of that body. (Actually, I suggest that the number of fully subscribed chief engineers is even lower than this and is barely 50 per cent. of the possible number.) The total number of supply undertakings (public authority and company) is 598, of which 195 (as a maximum) or 32 per cent. claim membership of the A.M.E.E.

Alderman Walker's concluding paragraph surprises me. I have nothing to gain or lose by being either inside or outside the A.M.E.E., and I am one of the few that have no personal axe to grind in this matter of salaries. My record of work and achievement is such that, personally, I should be quite content for my salary to be awarded on that basis. But I have raised no objection whatever to the adoption of the new Walker Scale and am prepared to give my full and vigorous support to it, on condition that a proper training scheme for administrative staff is set up in the electricity supply industry. I do hold the view, however, that salary has never made true status and will do so even less in the future.

Does Alderman Walker really believe that if the new scale is adopted it will result in the present chief engineers becoming more efficient or that it will improve their status as able and trustworthy administrators? Whilst believing that a yardstick for salaries is good (particularly below the £1,000 figure), I say quite clearly that the status of chief electrical engineers is low and deteriorating, not because of low salaries, but because we have refused to equip ourselves as administrators and to train others to follow in this tradition.

Will Alderman Walker, or some of the 195 members who are the A.M.E.E., please be good enough, and wise enough, to appoint a Committee who will examine my indictments fairly and with unbiased minds? If then I am proved wrong, I will willingly and apologetically abandon my brief.

J. A. SUMNER,
*Norwich.* *City Electrical Engineer.*

## Trade Commission

A RECENT prosecution over a "secret commission" on material supplied to the Government raises doubts whether certain commissions commonly paid have now become illegal and the opinion of your readers would be of interest. The following two examples present the problem concisely:—

(1) A manufacturer, having quoted a wholesaler for material for a certain factory, receives the order direct from the factory. Should the wholesaler be credited with the amount of his normal preferential discount to compensate him for his trouble in the inquiry, bearing in mind that the equipment of the factory will very likely be paid for by a Government Department?

(2) A contractor had (before the war) assisted, by his recommendation, in getting a manufacturer's equipment adopted at a factory. This factory then ordered direct from the manufacturer and as it was entitled to full trade terms, this appeared to be unfair to the contractor, who was therefore offered a commission on such orders as a reward for his friendly assistance. Is such a commission now legitimate on the assumption that the Government will be paying the owners of the factory for the equipment they install?

*London, S.W.*1. IGNORAMUS.

# Earthing in Factories

## *Reducing Fire and Shock Risks*

**By "Rotor"**

**Last week the author dealt generally with earthing systems and methods of testing electrodes. In the present article problems associated with the earthing of industrial plant are discussed, the procedure for complying with the regulations being indicated**

AN earth-continuity conductor, in order to comply with the requirements of the I.E.E. Wiring Regulations, must not have a resistance of more than one ohm when measured from the connection at the earth electrode to any other point of the installation. This simply necessitates using a large enough earth conductor, cable sheath or conduit with sound joints. The earth conductors should have a cross-sectional area of not less than 0.0045 sq. in. Where direct earthing is employed each fixed earth conductor should have a cross-sectional area of not less than half that of the largest conductor to be protected, provided that it does not exceed 0.1 sq. in.

A further I.E.E. requirement is that every effort should be made to make the consumer's earth resistance (the sum of the earth-electrode resistance and the earth-continuity resistance) low enough to allow the passage of sufficient current to operate the overload releases or fuses in the event of an earth fault. In the case of a 5-HP motor on a 400-V three-phase supply with earthed neutral, a strand of No. 26 SWG copper wire melting at about 40 A may be used. If any earth resistance other than that at the consumer's premises be neglected, the consumer's earth resistance may have a value as high as $\frac{230}{40} = 5.75$ ohms. Allowing a maximum of 1 ohm for the continuity resistance leaves 4.75 ohms for the earth electrode resistance. Generally it would be fairly easy to obtain, and maintain, the resistance below this value.

On the other hand, a 200-HP, 400-V motor might have overload releases set as high as 450 A, in which case the permissible consumer's earth resistance would have to be restricted to $\frac{230}{450} = 0.51$ ohm. Such a low resistance might be very difficult to maintain, and the passage of 450 A along the earth conductor could cause serious heating at a faulty joint. For example, the $I^2R$ heating at a joint having a resistance of 0.01 ohm would be $450^2 \times 0.01$ or so (2.02 kW) for a short time before the trips operated, and this might introduce a risk of fire. Should the total resistance be too high to allow 450 A to flow, a slightly lower amount of heat might be maintained at the faulty joint for some time, and the potential of the motor frame might be about 230 V above earth during this period.

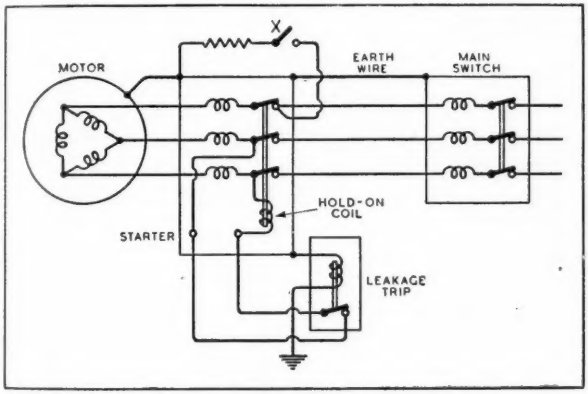



**Fig. 1.—Earth-leakage trip used with motor**

The maximum possible earth-leakage current is assumed to be the supply voltage above earth divided by the consumer's total earth resistance. The I.E.E. Regulations accept direct-earthing protection where the earth resistance by test is such that possible leakage current is greater than the overload trip setting or the melting current of the fuses. Direct earthing also satisfies the Regulations for a circuit rated up to 100 A where the metalwork is earthed to an urban system of metallic underground water mains with metal-to-metal joints. The earth connection, in this case, should be taken to the

main water pipe where it enters the building, or, if it is taken to any other point, the resistance of the piping including joints must be low enough to ensure that a potential difference over 40 V cannot exist between any two points on it. In other words, the product of pipe resistance and overload setting (or melting current of fuses) must not exceed 40.

### Neutral Point Earthing

Where a step-down transformer or generating plant is installed on a consumer's premises, the neutral point of the supply is available to the consumer, and the metal casing of the whole plant can be connected to the neutral at the supply-plant earth electrode. The earth-fault current arising from a failure of the insulation on the consuming apparatus will not require to pass through the earth electrode in these circumstances. It is then a simple matter to keep the fault-current circuit resistance low by careful design, installation, and maintenance of the earth continuity conductor. There exists, however, a risk that breakage or careless disconnection of the earth-continuity conductor may allow the whole of the connected plant to be alive in the event of a fault on one item.

It should hardly be necessary to mention that the earthing conductors should be as straight as possible, but I have on more than one occasion come across bonding wires on an appreciable voltage drop across the ends of the wire should an earth fault occur.

Where the metal framework is connected to the neutral of the supply plant, the earth current from a faulty conductor not surrounded by metal, such as an overhead wire, may have to pass through the earth electrode at the supply plant. Furthermore, in the event of failure of the insulation between primary and secondary windings of the supply transformer, the transformer tank and the whole of the connected consuming apparatus may rise to a high potential above earth. For these reasons the earth-electrode resistance must be kept low.

### Earth-Leakage Protection

Where the above conditions cannot be complied with, the I.E.E. Regulations require the use of an earth-leakage protective device which will cause disconnection of the live conductors if the potential of the metal framework exceeds 40 V above earth. This device (indicated in fig. 1) can be used in addition to, or in place of, direct earthing and can be connected to the main or individual circuits. The earth electrode of the leakage trip should be clear of the resistance area of any electrode used for direct earthing, and the earthing lead for the trip should be insulated if there is any possibility of accidental contact with other earthed structures.

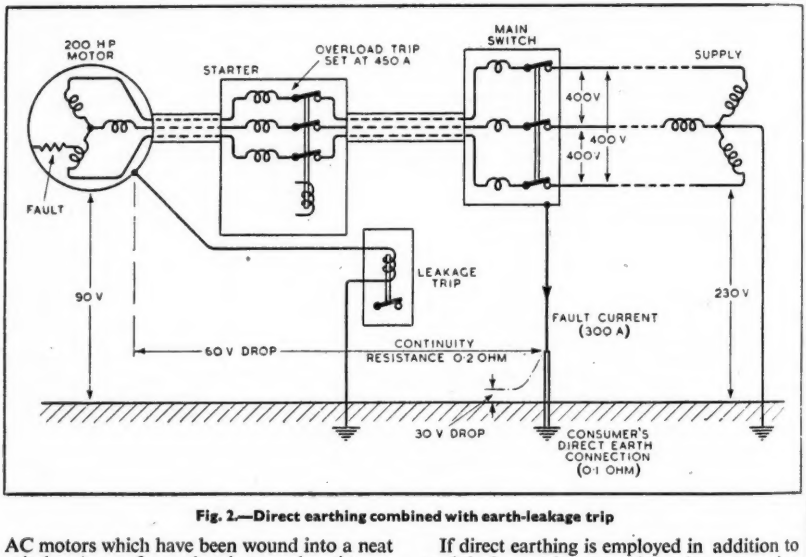



**Fig. 2.—Direct earthing combined with earth-leakage trip**

AC motors which have been wound into a neat spiral. Apart from the increased resistance introduced by the extra wire, the earth current sets up a magnetic field in the coil and the resulting impedance may be such as to create

If direct earthing is employed in addition to earth-leakage trip protection, the connection of the leakage trip at the main switch really only provides against the potential of the main earth electrode rising above 40 V to earth. A

high resistance fault on the 200 HP motor mentioned above might cause its frame to be alive at, say, 90 V (fig. 2). The earth circuit resistance might consist of 0.2 ohm for the earth conductor and 0.1 ohm for the earth electrode. The fault current would then be $\frac{90}{0.3} = 300$ A, which would not operate the overload releases if the motor was lightly loaded. The earth electrode would then be at 30 V above earth and the voltage drop along the earth conductor would be 60 V. An earth-leakage trip connected to the main switch would not operate, the motor frame remaining at 90 V above earth with 300 A fault current flowing until the fault reached more serious proportions or the motor was switched out by hand. If direct earthing were not employed in addition to the leakage trip, the fault on the motor would cause the full 90 V above earth to exist throughout the installation and the trip would operate immediately.

On the other hand, if direct earthing were employed in conjunction with a leakage trip connected to the motor frame (necessitating separate trips for each motor), the trip would operate in the event of a dangerous rise of potential on any connected metalwork between the motor and main switch. The trip coil would then receive the highest voltage on the framework less a negligible drop due to the passage of the trip current along the earth conductor. Separate leakage trips have the further advantage that only the affected motor is tripped out in the event of a fault.

The operation of the leakage trip can be tested by pressing a test key which connects one live pole to the framework through a high resistance. Separate test keys and resistances can be used on any part of the installation, as at X in fig. 1.

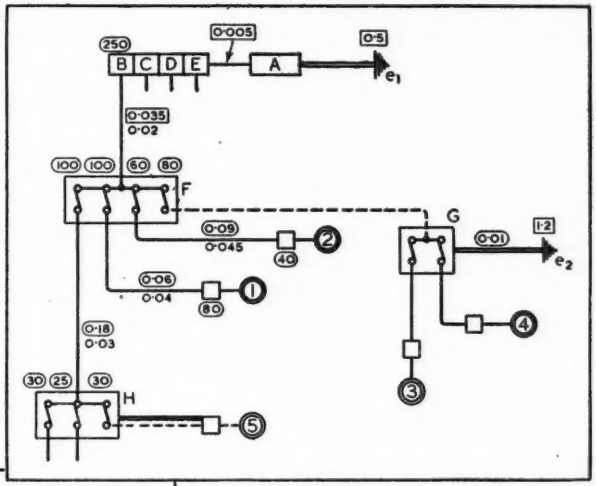



**Fig. 3.—Single-line diagram showing earthing conductors**

KEY CHART FOR EARTHING-CONDUCTOR DIAGRAM

A. Main switch, 400 A
B. 200-A oil switch (general) switch room
C. 200-A oil switch (foundry) switch room
D. 150-A oil switch (turners) switch room
E. 150-A oil switch (testing department) switch room
F. 100-A six-way dis. box, machine shop
G. 60-A two-way dis. box, pump room
H. 30-A three-way dis. box, fitting shop
1. 40-HP motor driving automatics
2. 20-HP motor driving grinder
3. 25-HP motor driving pump
4. 15-HP motor driving mixer
5. 10-HP motor driving lathes
$e_1$. Driven pipes outside switch room
$e_2$. Suction pipe of pump

## Earth Circuit Tests

The I.E.E. and Mines and Quarries Regulations require periodical testing of the resistance of the earthing circuits. Testing may be simplified by preparing a diagram of the installation showing all the earthing conductors. Fig. 3 shows a section of an installation with a single full line drawn to represent current carrying conductors surrounded with a metal sheath such as conduit, armouring, or lead sheathing, where the sheathing is bonded to the metal framework of the apparatus at each end. A dotted line represents conditions in which the earth wire is not continuous, such as cables on cleats, whilst a double full line indicates a wire used solely for earthing. All earth electrodes are shown on the diagram, the motors being numbered and the switchgear lettered to correspond with a key chart entered on the back of the diagram, as in the accompanying table.

From the diagram the whole apparatus earthed by any conductor can be seen at a glance and it is a simple matter to verify if these conductors are large enough. By this means the possibility of an earth conductor being overloaded through careless addition of plant is kept under check. When the resistance of current carrying conductors has been measured these are entered on the diagram, as shown by

the open figures on fig. 3, and these are used in measuring the resistance of earth conductors by the method indicated in the previous article.

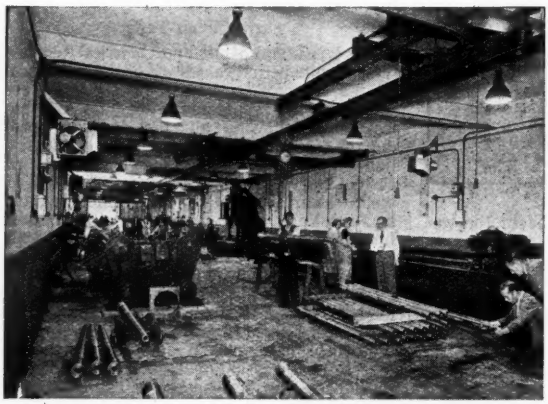
Each time earth-resistance tests are carried out a transparent sheet of paper can be laid over the diagram in a suitable holder, and the continuity resistance of each portion of the installation (indicated by a ringed figure) entered on the transparent sheet over the cable resistance marked on the diagram. Certain regulations require that the continuity resistance of the earthing conductors shall not be more than twice that of the cable protected. The position can be checked at a glance; for example, the section of cable between F and H does not comply with this.

If the fuse-melting or overload-trip currents are entered on the sheet, also in ringed figures, these can be used to check that the resistance at each and every point is low enough to ensure the cutting off of supply in the event of an earth fault. The method can be further simplified by working out the maximum earth-circuit resistance for each value of fusing current or trip setting. Considering motor No. 2, the total earth-circuit resistance at the starter is $0.5 + 0.005 + 0.035 + 0.09 = 0.63$ ohm. The maximum possible fault current is therefore $\frac{230}{0.63} = 365$ A, which is well above the 40 A overload setting of the starter or the 60-A fusing current of the distribution-box fuse. Separate diagrams can be drawn for the circuits fed from the main oil switches C, D and E.

On some of the older three-phase starters overload trips are fitted in two of the phases only. An earth fault on the unprotected phase may then require to be cleared by the fault current operating the overload release on the main switchgear, such a release usually being set at a higher current value than the starter release. Where these conditions apply, the maximum earth resistance for the motor circuit should be considered in relation to the overload setting of the switchgear provided with three overload trips.

# A Modern Factory Installation

MANY factories which are now engaged on war work have been permanently blacked out, and this has necessitated the provision of adequate artificial lighting as well as heating during the winter months when day and night shifts are being worked—an important factor in maintaining the health and efficiency of the workpeople. To meet these conditions an interesting installation has recently been completed in a factory in the south of England.



**A machine shop equipped with fluorescent lamps and electric unit heaters**

The heating consists of a number of G.E.C. thermostatically controlled electric unit heaters mounted on each wall. Each heater is rated at 15 kW and combines within the sheet-steel casing the heating element and a 15-in. diameter "Genalex" fan mounted on rubber cushions so as to minimise mechanical noise. The heater battery is wound for three-phase supply and is balanced over the three phases. In addition to its normal function of heating the factory, the installation can also be applied to the converse function of circulating air in summer and so assist the system of ventilation. A switching arrangement permits the fan of each unit to be operated independently of the heater battery.

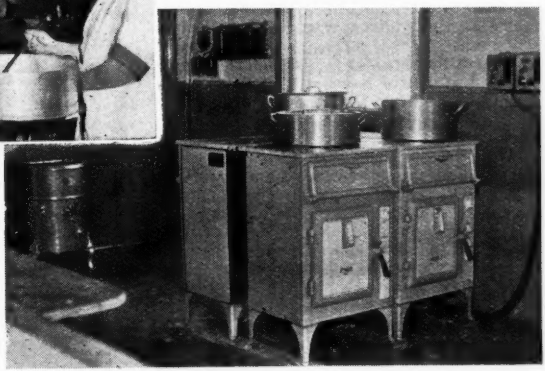
A canteen has been provided for the workers, where 1,500 meals are served each week, and the electrical equipment, as well as that for the lighting and heating systems, was supplied by the General Electric Co., Ltd. The cooking apparatus consists of an electric double-oven cooking range with a maximum loading of 23.2 kW, a steaming oven rated at 5 kW, a two-pan fish fryer with a total loading of 14 kW; a 5 kW vegetable boiler, a large hot-cupboard with a connected load of 6 kW, and an 8-gallon water boiler and a 50-gallon water storage heater which are loaded at 5 kW and 9 kW respectively.

The lighting of the factory is by electric-discharge lamps, and 125 W "Osira" fluorescent lamps fitted in semi-dispersive reflectors are used throughout the shops and uniform illumination is achieved on the whole of the working plane.

# Communal Feeding

## *Electrical Apparatus Proves its Worth*

LARGE-SCALE catering has sprung into considerable prominence within the past few months, and if last winter's air-raids are repeated it will demand still greater attention; some people even forecast a promising future for it after the war as a part of facilities for improving the lot of housewives and giving them extra leisure. Already sufficient experience has been obtained to demonstrate the outstanding advantages of electricity for providing the necessary services. The more generally well-known merits of electric cooking, its efficiency, cleanliness, etc., take second place to speed of installation and reliability. From results already achieved the latter is certainly greater than gas, and promises to be quite as good as solid fuel, too, if this is as difficult to obtain as it was the winter before last. Apart from the actual cooking there are also other applications of electricity to be taken into account in the matter of food preparation and storage.



**An electrically heated counter keeps the food warm while it is being served at the Erith community restaurant, the cooking apparatus for which is seen on the right**

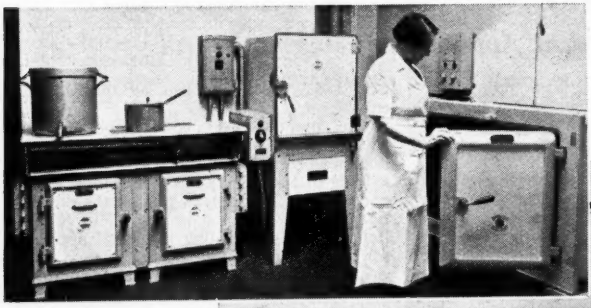
A typical all-electric community restaurant operated by a local authority (Erith) was described in the ELECTRICAL REVIEW of July 18th, and we now give details of three other somewhat different schemes, at a school, a power station and a factory. At the Black-a-Moor Council School a spacious kitchen where specially cooked and balanced meals are prepared has been electrically equipped throughout by the Blackburn Corporation electricity undertaking in conjunction with the General Electric Co., Ltd., which supplied all the necessary equipment.

This comprises a double-oven cooking range which has a total loading of 23.2 kW; a low-pressure steaming oven with a maximum loading of 5 kW; one 4-kW vegetable boiler; one 3.7-kW electric stock pot for the preparation of soup and for boiling milk; electric hot-cupboards and other incidental apparatus for the preparation and storage of food. The ovens and hotplates of the range are controlled by three-heat switches and the griller by two single-heat switches. The heating elements for the steaming oven are of the immersion type and are also controlled by three-heat switches which, together with pilot lights and fuses are mounted below the door, and are adequately protected from moisture.

In saying that the kitchen has a capacity for the provision of over 300 meals, this does, not take into account the nature of the meals provided. One of the important factors in the curative treatment of the children attending the school is the necessity for specially prepared meals. It is in this respect, particularly, that the electrical equipment is proving so versatile. For example, over a period of three months approximately 11,600 meals are served at a cost for electricity of less than ¼d. per meal, and the total cost works out at the surprisingly low figure of 4.05d. per meal.

That 5 cwt. of potatoes, 60 lb. of meat, 1 cwt. of carrots and turnips, quantities of peas, cabbage, and other incidentals can be prepared, cooked, and dished up each week by a kitchen staff of three is adequate testimony to

the labour-saving apparatus with which the kitchen is equipped. The lighting, switch-

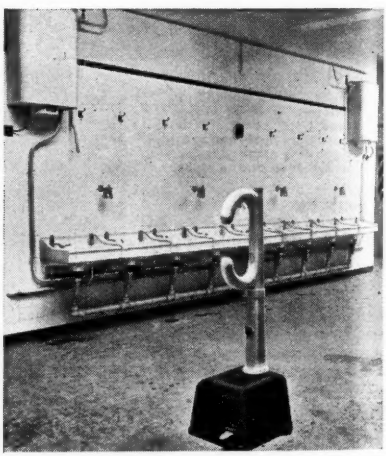


**Two views of the all-electric kitchen at one of Edmundsons power station canteens**

gear, conduit and all other electrical fittings are also of G.E.C. manufacture. The lighting fittings are of the utility type, neat in appearance and arranged to give maximum diffusion with a minimum of glare and shadow. More than three-quarters of a mile of "Silverlac" tubing was used in the installation.

Though the facilities available are generally similar to those of municipal restaurants and schools, the scheme for a power station is in rather a different class. An example which we have seen is a canteen which has been provided by Edmundsons Electricity Corporation, Ltd., for the convenience of those working at one of its generating stations (the company, incidentally, has equipped several of its works and offices with catering facilities wherever they are required). This canteen is designed to serve a staff of about a dozen as well as about sixty employees, though in practice, meals for double this number of men have at times been supplied without apparently overtaxing the resources of the electrical equipment installed.

The kitchen is conveniently situated between the staff room and the men's canteen, so that quick service can be provided equally well to either. Furthermore, to prevent the food from getting cold while being served the counter in the men's canteen is warmed, and a hot-cupboard is also provided. As might be expected, the kitchen is completely electric in every respect and this has assisted considerably in securing compactness. The equipment comprises a double Jackson "24 general-purpose oven, an English Electric double roasting oven, a Staines steamer (3 kW) for making puddings, etc., and two Burco wash-boilers (3 kW each) for vegetables, stews, etc. A Staines potato peeler and a washing-up machine are also provided, while for supplying tea a water heater of the same make has been fitted on the canteen counter; when unusually large quantities of tea are required another Burco



**Electric water heater and hand dryer in the washplace adjoining the Edmundsons canteen**

washboiler is brought into service for the purpose. For storing perishable foodstuffs there is a 16 cu. ft. B.T.H. refrigerator. Hot water for the various kitchen services and shower baths comes from an 80-gal. (18-kW) Heatrae self-contained water heater.

Apart from the high quality of the food and the quick service, the designers of the canteen have taken a lot of trouble to give the greatest possible comfort and convenience. In summer the air is kept in motion by means of G.E.C. ceiling fans, while for cold weather thermostatically controlled panel heaters (Unity) are inset in the maroon, brown and black tiled walls. The tables have brightly coloured red and brown tops and the chairs are of the modern tubular steel frame type.

**The modern all-electric kitchen at the Black-a-Moor school showing the double oven cooking range and one of the stockpots**

Separated from the canteen by a corridor is another example of the company's thought for its employees' convenience. The washplace, which is designed on the same principle as pithead baths for mines, has locker rooms at each end for clean and dirty clothes, shower baths and wash basins. Two sets of overalls and towels are supplied to each man every week, and for drying hands there are two English Electric "Phœnix" electric hand dryers, arrangements being made to install two additional dryers at a later date. Two self-contained 6-gal. Heatrae water heaters furnish continuous supplies of hot water and the room is warmed by means of four inset Unity convectors (2 kW each).

The fourth example of modern large-scale feeding methods is provided by the works canteen of Brookhirst Switchgear, Ltd. Here the kitchen is divided, one half being provided with electric cooking and the other with gas. This is purely a wartime arrangement designed to give duplicate facilities in the event of a failure of one of the supplies. The electric cooking equipment consists of two Jackson "7 D" double oven cookers, together with two Burco vegetable boilers. The two ovens together have six single and one double cooking plates on top and have a loading of 29.6 kW per oven. In addition there is a 24-ft.-long Jackson hot-cupboard, providing accommodation for nearly 200 meals.

The service is on the cafeteria principle, the kitchen being divided from the canteen proper by means of hatchways. The workers pass along the hatchways in two queues, picking up their meals as required and paying for them at a cash register at the end of each queue. In this way it is possible to serve meals at the rate of about 100 every four minutes. It is not possible to provide a great deal of variety in the menu under wartime conditions. One main course, usually of meat and two vegetables, with occasionally fish or fish cakes and vegetables, is followed by a sweet with the alternative of bread and butter and a cup of tea. The two-course meal is provided for 8d. in the case of women and youths and for 10d. in the case of men. The kitchen facilities, in addition to the cooking equipment already referred to, include an electric potato peeler and a cold store of 150 cu. ft. capacity.

## "Electric Cooking Craft"

HOUSEWIVES who cook by electricity, and especially those who are just learning to do so will find a great deal of useful information in "Electric Cooking Craft" published by the Electrical Association for Women, 20, Regent Street, S.W.1, at 4d. each (5d. post free), 4s. a dozen or 32s. per 100 post free. There is guidance on "How to Use Your Electric Cooker" and a table of facts and figures enables the housewife to calculate the consumption of each appliance and therefore the cost of using it. Particularly valuable are the recipes for nutritive dishes, which take into account the food economies which must be practised to-day. In addition to following the more usual recipes the housewife may care to "try her hand" at making cake with saccharine tablets or preparing spinach or nettles on toast.

# Warming Surface Shelters

## *First I.E.E. Installations Section Paper*

AT the opening meeting, on September 18th, of the newly formed Installations Section of the Institution of Electrical Engineers, a paper on "Space Heating by Means of Electrically Warmed Floors as applied to Surface-Type Air-Raid Shelters" was presented by Mr. R. Grierson. This included performance data obtained during an eight weeks' test (starting on February 4th last) of an installation the design and construction of which was described. The shelter was scheduled to accommodate fifty persons by day with bunks for thirty-three, and formed half of a pair of the semi-detached type.

An examination was made of the factors affecting thermal contrasts between normal buildings and shelters, transmission of heat to the occupants, thermal capacity of structure and surface condensation. The pros and cons of radiant and convection heaters were also discussed. The author claimed that no other form of space heating provided so much comfort for all the occupants of the shelter in relation to the cost of energy and the space occupied.

Other advantages were given as a substantial maintenance of comfort, owing to thermal storage, when supply was interrupted, whether deliberately during system peak periods or as a result of bomb damage; safety from electric shock or burns; low maintenance; no iron or steel and small number of man-hours needed in manufacture and installation.

### Proportion of Total Cost

Other points from the paper were that a shelter of the type under consideration cost, at 1s. 6d. per cu. ft. (internal), from £250 to £300 and an expenditure of 7½ to 10 per cent. of this for heating would be justified. Air temperature alone, as measured by ordinary thermometers, provided no true criterion of comfort, but thermal conditions at floor level influenced it profoundly. The average temperature of walls should not be appreciably lower than that of the air. Air at head level should not be distinctly warmer than near the floor and the heads of occupants should not be exposed to excessive radiant heat.

With 50 cu. ft. (minimum) per occupant, each supplying metabolic heat energy at a rate of 400 BThU per hr. the corresponding fortuitous gain from this cause was 2.34 watts (maximum) per cu. ft., which was twice the amount required to maintain a temperature difference of 30 deg. F. in a normal building. The shelter tested would have a metabolic heat gain of 3.86 kW when fully occupied at night.

The design of the warming installation was based upon a rate of air change of 3,100 cu. ft., the content of the shelter, every hour. With brickwork weighing 60 tons and having a specific heat of 0.2, the heat energy required per deg. rise in temperature was equivalent to 7.8 kWh, calling for an electrical loading of 3kW assuming no losses. Free moisture to be removed from the internal surfaces of a newly erected shelter, at 5 per cent. of the weight of the latter, would amount to 750 gal. and, at 1,063 BhU per lb. from and at 50 deg. F., its evaporation would require 2,300 kWh.

Estimates were based on the maintenance of a maximum temperature difference of 20 deg. F. above external air at 30 deg. (dry bulb) with one change of air per hr. For this a total of 3,360 W would be required, made up as follows :—Floor, 450; external wall, 885; partition wall, 155; flat concrete roof, 1,225; natural interchange of air (3,100 cu. ft. per hr. at 110 W per 1,000 cu. ft. and 20 deg. rise), 340; addition of 10 per cent for acceleration after interruption by time switch, 305.

For the floor-warming installation, 70 deg. F. was taken as the maximum permissible surface temperature. At 90 per cent. emissivity, radiation upwards would require 35.5 W, but 30.4 W had to be deducted for emission from walls and ceiling at 50 deg., leaving 5.1 W as the net emission by radiation. Assuming the temperature of air entering to be half way between 50 and 30 deg., *i.e.* 40 deg., heat transmission by convection would be 70—40 deg. = 30 deg. difference, making 7.8 W. Conduction through subsoil amounted to 70—50 deg. so that 20 deg. had to be provided for, the equivalent of 1.18 W. The total rate of natural convection was thus 14.08 W.

### Make-up of Cable

Soil heating cable (cupro-nickel wire lapped with asbestos and covered with impregnating paper, sheathed with lead alloy, lapped with impregnated paper and braided with impregnated jute) with a loading of 4.67 W per linear ft., was employed as the heating element. It was laid at 4-in. centres on the concrete floor, the warmed area being 24 ft. 6 in. by 10 ft. giving 14 W per sq. ft. Magnesia-oxide insulated copper-sheathed cable was suggested as a possible alternative.

Both buried and duct systems had been used successfully. The latter had the advantage that a faulty cable could be replaced without disturbing the floor surface, but the author had never yet found any replacement necessary. Each circuit was fused on the phase side and

the neutral ends were connected to a common busbar.

Temperature control was provided by a Rheostatic "Q" thermostat of the accelerated type, thermally insulated from the 14-in. external wall, with the movement totally enclosed in a thin sheet-steel box painted dead black inside and out, for the purpose of absorbing the radiant and convected heat energy and transmitting it to the bi-metal strip. The mounting height was 2 ft. 9 in. Time switch control was also provided. Surface temperatures were taken with a Cambridge auto-compensated cold-junction thermo-couple and millivoltmeters with a range of 0–500 deg. F.

### Maintaining Temperature Difference

In his analysis of performance data, Mr. Grierson emphasised that a normal installation could not be economically designed to maintain any predetermined internal temperature but only to maintain a specified difference between internal and external dry-bulb temperatures. A further point not appreciated by the lay mind was that when this temperature difference was doubled, the rate of flow of heat energy was doubled.

Tests revealed that the air temperature in the shelter at foot level was 2.5 deg. F. in excess of that at a height of 7 ft. 2 in. thus giving cooler air at about head level. Although visible sweating of the walls had ceased at the beginning of the fourth week, there was a continued removal of about 6.8 gal. of moisture during each of the remaining weeks of the test.

Since the temperature of the subsoil was stabilised at the summer value of about 60 deg. at a depth of 2 ft. there was no danger to the stability of the structure owing to evaporation of moisture. Indeed a floor-warming installation would be better described as a "prevention of cooling installation," which was arranged to function so as to maintain autumn temperatures.

With a warmed floor area of 245 sq. ft. and a mass of subsoil to a depth of 3 ft. 6 in. maintained at 58 deg. the volume of 860 cu. ft. with a weight of 46 tons was available for heat storage in the event of failure of electricity supply, as records taken proved.

### Heat from Occupants

Even during frosty weather the thermal problem of a fully occupied shelter was not one of space heating but of preventing excessive rise of temperature. The fortuitous gain of metabolic heat energy for thirty people for ten hours each night from October 1st to April 30th would be equivalent to 7,280 kWh, which at 0.5d. per kWh represented a contribution of £15 3s. 4d. towards the cost of warming the shelter. In estimating the seasonal consumption of electricity, the safe course was to assume the shelter to be unoccupied and then to consider probable credits from metabolic gains.

Each natural change of air per hr. for a 3,100 cu. ft. shelter warmed through 20 deg. F. involved an expenditure of 0.34 kWh which, if continued through a heating season of 5,000 hr. represented 1,700 kWh, the value of which at 0.5d. per kWh would be £3 10s.

For the worst normal weather conditions, the estimated rate of transmission from the shelter was 3,055 W for one natural interchange of air per hour, which was the equivalent of 62 per cent. of the cubic content of the shelter. Deducting 130 W for the excess air change left a balance of 2,925 W.

External surface coefficients were based on a 15-MPH wind and transmission coefficients excluded credits for any gains of solar heat. Applying a correction factor of 0.8 to provide for these two items, left 2,340 W or at the rate of 117 W per 1 deg. F. difference in temperature maintained.

Appendices to the paper give details relating to the intermittent heating of walls, the transmission of heat energy by radiation and the transmission of heat energy by convection.

# Supply in Portugal

PORTUGAL'S electricity supply industry is comprehensively surveyed in the latest annual report (for 1939) of the Board of National Electrification, Lisbon, a copy of which we have recently received. The report, shows that aggregate production for the year was 448 million kWh, an increase of 5.2 per cent. over that for 1938, due entirely to hydro-electric plant, thermal production declining slightly.

Altogether water-power was responsible for 41 per cent. of the total output. Plants of this type numbered 107 with an aggregate capacity of 82,366 kW, of which 50 (71,208 kW) were engaged in public supply. Thermal plants numbered 551 with 197,576 kW, of which 129 (139,873 kW) were for public supply. The chief extensions during the year were the completion of a 2,750-HP hydro-electric plant on the River Ave (Companhia Electro-Hidraulica de Portugal, Oporto) and one of 805 HP on the River Nisa (Companhia Hidro-Electrica Alto Alentejo, Lisbon), but five old thermal stations were closed down and the total capacity of plant in use (279,942 kW) was only 177 kW more than in 1938.

Of the total output approximately 53.4 per cent. was for power and agricultural purposes, 23.6 per cent. for lighting, 17 per cent. for traction and 6 per cent. for electro-chemical industries. The average annual consumption per inhabitant amounted to only 59 kWh. The largest undertaking in the country is the Companhias Reunidas Gas e Electricidade, Lisbon, whose Tejo steam station has a capacity of 51,192 kW, the output in 1939 being 116 million kWh.

With regard to high-voltage lines, the chief addition during the year was the completion of a 60-kV line 24½ miles long between Lousa and Santa Luzia, for the Companhia Electrica das Beiras. Altogether, new high-voltage construction amounted to 316 miles, making 3,490 miles in all, 3,161 miles of which was overhead.

# Lease-Lend Supplies

## *Effects upon Export Trade*

FUNDAMENTAL changes in our conception of the part which export trade must play in our prosecution of the war have been brought about by the passage of the United States Lease and Lend Act. Discussions on the subject have recently taken place between Ministers and the United States Ambassador and correspondence arising out of these exchanges of views was published last week in the form of a White Paper. This sets out the principles which should govern the use and distribution of "Lease-Lend" materials in this country and says that it is plain that nobody must be allowed to use the fact that we get supplies on special terms from the United States as an opportunity for private gain. The Government has been careful to see that proper remuneration and no more is paid to those to whom the distribution of such material is entrusted. It is resolved that "Lend-Lease" supplies of every kind shall be used for the good of the community as a whole and for the prosecution of the war effort.

### Letter to Export Groups

The matter is dealt with in similar terms in a letter which has been circulated to chairmen of Export Groups by Mr. F. D'Arcy Cooper, Chairman of the Business Members, Industrial and Export Council. In this Mr. Cooper says that United Kingdom export policy has, during recent weeks, been widely attacked in the United States on the ground that, while shortages owing to priorities impeded the United States export trade or altogether debarred United States citizens from exporting, United Kingdom manufacturers for export are using "Lease-Lend" materials, or taking advantage of the arrival of these materials, to export to the United States itself or to South American markets, and are offering lower prices or earlier deliveries than their United States competitors. There has been much misrepresentation, some of it doubtless deliberate, and such misrepresentation will naturally have been resented by exporters in this country.

The fact is that a change in the situation has taken place. So long as we were required by the United States to pay cash for whatever supplies we needed from that country, it was vitally important to us to earn as many dollars as possible; we had to be prepared to stint the civil population if necessary in order to do so, and we urged our traders to make every effort to sell in dollar markets and in those South American markets from which we were drawing essential supplies. To this appeal there was a wide response, and as industry must lay its plans many months ahead, it was not to be expected that the course of export trade could be changed overnight, when the Lease and Lend Act received the President's signature.

There will doubtless have continued to arrive in the United States, in the days of "Lease-Lend", goods of which delivery was planned in the days of "cash and carry." In the changed circumstances, this delivery has been misunderstood, and very easily misrepresented. At the same time, we would not wish to use for the purpose of maintaining our export trade, still less to replace United States exports, material of which the United States exporter has been deprived in order that that material should be made available for our defence, and His Majesty's Government has, therefore, offered to the United States Government the undertaking which is contained in the White Paper referred to above.

The undertaking will add further to the many difficulties under which the export trade already labours, but it is clear that our export policy must offer no ground for any belief in the United States that the assistance which we are receiving under the Lease and Lend Act is being abused. While, however, it is just to insist that material is not being made available in order that someone may make a commercial profit on it, or in order that material which would otherwise have been devoted to the defence effort may be turned to commercial profit, it is, nevertheless, wrong to jump to the conclusion that the United Kingdom need no longer trouble about its export trade. Exports, properly directed and so controlled as not to allow the use of "Lease-Lend" materials to facilitate competition with the United States, remain essential to the maintenance of the maximum war effort.

## Illuminated Signs Outside Shops

THE Ministry of Home Security reminds shopkeepers that during the black-out shops must not have any lights visible from outside except certain permitted dimly illuminated signs. These signs must be placed inside a ground floor window or doorway and must not be conspicuous at a distance of 100 ft. The brightness of the light must not vary but it may be of any colour. The illuminated area of all the letters or symbols together must not exceed 144 sq. in., and all letters or symbols must be within a rectangular space not more than 3 ft. wide and 2 ft. high. No light must show except from the letters or symbols. The face of the sign must be kept vertical. The number of signs allowed is one for each doorway through which the public is admitted. The signs may only be illuminated for such time as the shop is open for business. Precautions must be taken to see that no light shows from doorways when customers go in or out.

# COMMERCE and INDUSTRY

## *Electrical Employees' Movements. Contractors & War Damage.*

### "Protection" for Contractors

THE position of electrical contractors in relation to the Schedule of Protected Establishments was left in a very unsatisfactory state by a decision of the Ministry of Labour that only work carried out directly for Government contracts wasrecognised as a qualification for a firm's "protection." Contracts for the installation of, or maintenance of, electrical plant in the premises of firms engaged on Government contracts, were not considered Government work for the purposes of registration.

After making representations on the matter to the Ministry the Director of the Electrical Contractors' Association (Mr. L. C. Penwill) is now able to inform his members that in addition to qualifying directly for registration they can now apply if they are carrying out work for protected establishments or certain important work for local authorities (*e.g.*, the lighting and heating of air-raid shelters).

Members who have previously failed to secure protection or who have not applied before should now make application on form N.S.168 which is obtainable from local offices of the Ministry.

### Dumfries Food Advice Bureau

A Food Advice Bureau has been opened in one of the Dumfries County Council Electricity Department's branch showrooms at Annan. The inauguration took place on September 5th, when Miss Sunday Wilshin, the B.B.C. personality probably better known as Mrs. Wilks of the "Black Dog", introduced the purpose and benefits of the bureau to a large and interested audience. The inauguration was followed by an excellent wartime cooking demonstration given by Miss Weedon, of the Jackson Electric Stove Co. Further demonstrations will be held regularly in support of the effort.

### Purchase Tax Limit Reduced

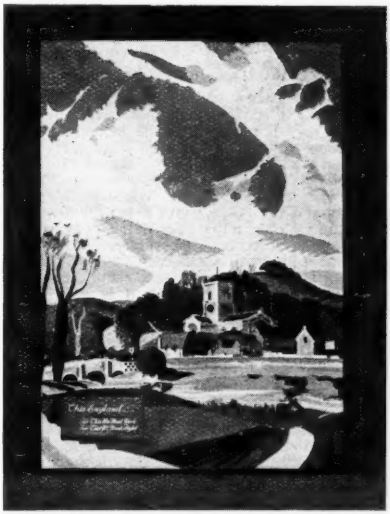
Under the provisions of the Purchase Tax (Reduction of Registration Limit) Order (S.R. & O. No. 1389) manufacturers and wholesalers of goods subject to the tax whose average annual gross proceeds on the sale of these goods exceed £500 are liable to register. The limit was originally fixed at £2,000 per annum and therefore the new Order will bring into the scheme a great many small concerns.

### Transfers of Supply Men

Since the coming into force of the Essential Work Order as it affects electricity supply undertakings the Ministry of Labour and National Service has received applications from employees in the industry for permission to take up more responsible posts in other undertakings. The Ministry has informed the Electricity Commissioners that it is not intended that the Order should restrict normal promotion and as such transfers should result in fuller use being made of the abilities of the employees the Ministry would normally give the required permission unless there were strong reasons against such a course. It is suggested that if an undertaking feels any difficulty in agreeing to the release of an employee and is of the opinion that the case merits special consideration it should notify the Electricity Commissioners of the circumstances and obtain their views before the matter is submitted to the National Service Officer.

### An Art Gallery in Kingsway

It is about nine months since the frontage windows of the General Electric Co., Ltd., at Magnet House, W.C.2, were blown out during an air raid. They were, of course, boarded up, but



**One of the G.E.C.'s brightened boarded windows**

as the thousands of people who pass up and down Kingsway know, this was done in a distinctive and original manner which has done much to publicise many Government propaganda schemes as well as many of the varied activities of the company.

Freshness as well as originality is one of the essentials of successful displays, and effective though the treatment has been, a complete change both in design and type has recently been effected. The artist Lupton was commissioned to produce the originals and to supervise the preparation and erection of the complete group of new displays which have been reproduced from them. The accompanying illustration gives some idea of the nature of the designs, but the true effect can only be fully appreciated by seeing the originals which adorn the facade of Magnet House. The designs are bold in conception

and are almost luminous with cheerful splashes of colour, and within a few hours of the mounting of the displays a number of offers were received to buy the original of one of them—"This England" which we reproduce.

## Grimsby Staff Salaries

The Grimsby Electricity Committee has recommended that the salaries of members of the clerical staff of the undertaking shall be revised according to Scale No. 2 of the Midland Provincial Council. The engineer (Mr. S. R. Windle) said that the revision would affect the salaries of the more permanent staff; it would not apply to juniors or to men serving in the Forces.

## Electricity Returns to the B.o.T.

As was foreshadowed when the Ministry of War Transport was set up, the administration of electricity supply has been transferred to the Board of Trade under whose control it was originally placed. The address of the department concerned is New Oxford House, Bloomsbury Way, W.C.1. The Electricity Commissioners are remaining at Savoy Court, Strand, W.C.2.

## Fire Guards for Substations

When electricity supply undertakings have notified the Electricity Commissioners of their inability to make adequate arrangements for the prevention of fire at unattended substations they have been advised to seek the aid of the local authority. The matter has now been put on a more regular basis for the Minister of Home Security and the Secretary of State for Scotland have notified local authorities that this assistance should be afforded and have indicated the basis on which it might be arranged.

Undertakers have been asked by the Commissioners to inform them if it is not found possible to make suitable arrangements.

## New Fire Prevention Order

Many obligations are placed upon employers by the Fire Prevention (Business Premises) (No. 2) Order which comes into force on September 22nd. While the main provisions of the original Order remain unchanged the new measure orders that occupiers of business premises shall provide sleeping, washing and sanitary facilities for fire guards and a scale of subsistence allowances is laid down. For a continuous period of not more than 12 hours 3s. must be paid; for between 12 and 18 hours the allowance is 4s. 6d.; and between 18 and 24 hours, 6s. The cost is to be met by the Exchequer.

A memorandum issued with the Order states that reasonable travelling allowances will be allowed to fire guards and they will receive compensation for injuries sustained while on duty and a supplementary payment to reimburse them for the loss of earning power while incapacitated. Payment will also be made in respect of damaged clothing.

## Electricity Price Increases

Replying to a question in the House of Commons last week the Chancellor of the Exchequer said that in his Budget speech he spoke only of preventing or minimising the impact of certain increased costs on the prices of essential goods and services. The effect of increases in electricity and gas charges was very small.

Since the Budget statement, the Electricity Commissioners had been notified by eight local authorities and two company undertakers of increases in electricity charges brought into operation after that date. These increases ranged up to about 15 per cent. on the then existing charges, some of which were pre-war charges and other increased charges brought into force at an earlier stage of the war. None of these increases was regarded by the Commissioners as unreasonable or as justifying any intervention by the Minister of War Transport.

The September *I.M.E.A. Journal* reports that a member of the Association has communicated with the Council referring to the policy which the Ministry of War Transport is adopting in relation to the question of electricity charges. His corporation expressed the view that the present policy of attempting to limit the price of electricity will be incomplete, unless the Government takes the necessary steps to control the price of coal, the rates of wages, and the price of essential material and plant. The member has been informed that, in the opinion of the Council, the Electricity Commissioners will not refuse reasonable increases in the charges for electricity, but, in submitting applications to the Commissioners, undertakings must give full details, including the reason for the increases.

## Trading with the Enemy

The Board of Trade has made a new Order which came into force on September 11th containing 321 additions to the "Black List" of traders in neutral countries with whom it is unlawful to have dealings of any kind. Further additions will be made in due course. Copies of the Order, Trading with the Enemy (Specified Persons) (Amendment) (No. 15) Order, 1941 (S.R. & O., 1941, No. 1334), may be obtained from the Stationery Office or through any bookseller, price 3d. net.

## War Damage Insurance

The Board of Trade has decided with the approval of the Treasury that the premium payable under the War Damage Insurance Business Scheme for the whole year to September 30th, 1942, shall not exceed 30s. per cent. For the period of six months up to March 31st, 1942, the rate of premium will be 15s. per cent., which will be payable at the option of the insured either in one sum or in two equal instalments. The rate of premium for the subsequent six months will be determined in March next and will not exceed the limit indicated.

## Hollow-ware to be Standardised

The Board of Trade has issued the Hollow-ware (Control of Manufacture) Order, 1941 (S.R. & O. No. 1345) with the object of effecting economy in the use of labour and materials by standardisation in manufacture of hollow-ware in general demand, principally for domestic purposes. The Order, which comes into effect on September 24th, forbids, except under licence, the production by manufacturers who are on the Home Trade Register, Class 9, of the Limitation of Supplies (Misc.) (No. 11) Order, 1941, of hollow-ware made wholly or mainly of iron or steel. Manufacturers who are not registered under that Order do not require a licence. Licences must be applied for immediately from the Board of Trade, Industrial Supplies Department, Millbank, London, S.W.1. The hollow-ware affected includes such articles as pots, pans and kettles, whether

galvanised, japanned, enamelled or treated in any way. By eliminating a number of sizes and shapes, standardisation should make possible manufacture of larger quantities of goods from given amounts of material and because of economies in labour and material should decrease rather than increase prices.

## E.W.F. Membership

We have received from the Electrical Wholesalers' Federation a copy of its list of members for 1941. Membership is shown both alphabetically and geographically. Mr. A. Albrecht, the Director, tells us that, owing to the shortage of paper, it may be impossible to produce a 1942 edition, but that notification will be given of any major alterations.

## Engineering Bulletin

The fourth of the "Engineering Bulletins" issued by the Ministry of Labour and National Service contains articles on "The Problems of Setting-up," "News from Training Centres," "Women in a Midland Factory," "More About Accident Prevention" and "The Indian Training Service" (the training of Indian workers in British factories).

## Fatalities

An inquest was held at Kingston-on-Thames recently on Thomas Farnham, aged fifty, a cleaner employed at a local store (Bentalls, Ltd.) who received a fatal shock from an electric floor-scrubbing machine. Mr. J. J. Macnamara, maintenance foreman, said that operators were instructed to wear rubber boots when the machine was in motion and to fill the machine with the switch off. A slight shock had been the only trouble previously experienced with the machine in four years.

Mr. E. J. Jarvis, borough electrical engineer, said he found contact from the negative side to the frame which was, however, perfectly earthed. He found nothing to cause a shock from the frame. There must have been some defect in the earthing, but he had not been able to discover it. The same conclusions were reported by Mr. A. M. Perry, a Home Office inspector.

The coroner, who returned a verdict of death from misadventure, said that from the evidence it appeared that deceased was doing two things he had been instructed not to do. He was using the machine without wearing rubber boots, and was filling it with water while it was switched on. Both of those things would, no doubt, cause him to get a shock. There did not appear to be any evidence of negligence on the part of anybody.

While working in a shed occupied by a rabbit and poultry dealer at Misterton, Reginald Harry Brown, aged eighteen, received a fatal electric shock, and an inquest was held at Crewkerne last week. The evidence showed that he was engaged n hanging dressed poultry on to a number of steel tubes and received the shock from one of them; when the electric light was switched off his hand was released and he fell to the ground dead. Mr. F. J. Moores, an electrician, stated that rubber cabling was fixed to a beam and some galvanised wire had been wound tightly round the beam and over the cable. From the wire was suspended the steel tubing. Continual weight on the steel tubing had caused the wire to wear through the rubber and it had become alive. He added that he had fitted the lighting installation in 1933, but the galvanised wire was not round the cable then and must have been placed there since. A verdict of "Death from misadventure" was recorded.

An inquest was held at Prestatyn last week on James Harrison, a ten-year-old evacuee, who received a fatal electric shock when he climbed a transformer structure in a field. Another boy, who was also playing in the field at the time, said he saw James Harrison climb up the pole as far as the second box, catch hold of the wires with both hands, and then fall into the hedge. He thought they were telegraph wires. Mr. F. Neal, a mains engineer of Electricity Distribution of North Wales and District, Ltd., stated that the transformer in the field was supported by a three-pole structure, the cross-members of which were covered with barbed wire. The lines to the transformer operated at 11,000 V. In reply to a question by the coroner he said that a barbed wire entanglement at the base of the structure would be a better safeguard. The coroner recorded a verdict that the boy was accidentally electrocuted.

## "Ekco" Lamp Publicity

"Cast the gloom from every room with Ekco lamps" is the advice given in a cheerful new poster produced by E. K. Cole, Ltd., which should be popular with dealers. "Mr. Bright," introduced last year, is also featured again in two new cut-outs. These have been economically designed to make clever use of the colourful lamp cartons as part of the displays which will prove valuable for counter and window use. A new slogan which makes its appearance in this year's publicity is "Ekco lamps are good—it's easy to see." An effective idea is used in a small poster which shows, coming out of the blackness of a room suddenly plunged into darkness, a voice, saying "Why on earth didn't you get an Ekco lamp?" For the "Sirius" range of shilling lamps a new cutout and window sticker are added to the existing display pieces. Stocks of certain items in last year's extensive sales aid programme are also available, and the whole programme will be dealt with in a broadsheet to be issued in the near future.

A cheerful "Ekco" poster

## Repair of War Damage

The Electrical Contractors' Association has brought to the notice of its members an instruction of the War Damage Commission that any person preposing to execute works of war damage repair in certain areas must notify the Commission if the cost will be more than £1,000 or ten times the net annual value of the property, whichever is the less. This is to enable the Commission to consult local planning authorities to ensure that

the proposed works will fit in with their schemes.

Contractors incurring larger expenditure without notifying the Commission will be likely to forfeit their payments from the Commission. The areas specified are the City and County of London, Birmingham, Bristol, Bootle, Birkenhead, Southampton, Coventry, Hull, Liverpool, Plymouth, Salford, Sheffield, Swansea, Wallasey and Gosport.

## Cable Jointers' Wages

As from the first full pay period following August 27th the war bonus for plumber jointers, jointers and jointers' mates is increased from 2¼d. to 2¾d. per hour in all districts except the Greater London Area in which a special arrangement operates. The bonus, which is reckoned in the calculation of overtime, remains at the new level until January 31st next.

## Marine Electricians' Pay

New standard monthly rates of pay for marine engineers are set out in the September *A.E.U. Journal*. The rates for electricians are as follows: —When one only is carried, £19–21; where two are carried—first, £22–24, second, £18–20; where three are carried—first, £24–26, second, £19–21, third, £16–18; where four are carried—first, £25–27, second, £20–22, third, £17–19; fourth, £16–18. The rates are subject to yearly increments of £1.

## Sunderland and "Chiefs'" Salaries

The Sunderland Electricity Committee, "in view of the impossibility of foreseeing the economic conditions prevailing after the war" has decided not to approve the agreement arrived at by the National Joint Committee of Local Authorities and Chief Electrical Engineers with regard to salaries and conditions.

## Machinery and Plant (Control) Order

Under the Machinery and Plant (Control) Order made by the Board of Trade and dated September 11th, a general licence is issued permitting the supply of machinery, plant and appliances of certain specified kinds to mining undertakings where the authority of the Mines Department of the Board of Trade has been obtained for the acquisition of any such goods. Copies of the Order, S.R. & O. 1941 No. 1392, are available from the Stationery Office or through booksellers.

## Electrified Garden Fence

At the Birmingham Police Court recently, Ferdinand Carlos de Paeztron, of Dovey Road, Moseley, was fined £10 with 18s. 6d. costs for causing a five-year-old boy, Gareth Roe, to suffer grievous bodily harm. It was stated that the defendant, warned of a plot to rob his garden, ran a wire from the electric main and connected it with the wire on the garden fence, which thus became electrified at 230 V. The lad might quite possibly have been killed.

## Fire Watching at Swindon

It was recently reported to Swindon Corporation Electricity Committee that in connection with the A.R.P. duties of electricity workers, the Electricity Commissioners had replied stating that as the scheme for fire prevention duties adopted by the Council under the Fire Prevention (Business Premises) Order, 1941, in respect of the electricity undertaking was a voluntary one under Article 3 (2) of the Order, the Commissioners had no jurisdiction to approve or disapprove the continuance of the special payment made to such men. The matter was referred for discussion between both employer and employee representatives on the Works Committee of the Electricity Department.

## Dissolution of Partnership

A. C. Gatensbury and F. G. Gatensbury, trading as "Berisfords (Stoke-on-Trent)," salesmen of electrical and wireless accessories, etc., 5, Majestic Buildings, Stoke-on-Trent, have dissolved partnership.

## Change of Address

The Palnut Co., Ltd., has moved to Joymance Works, Cambridge Grove, Hove (telephone: Hove 5004).

## New Catalogues and Lists

**R. F. Winder, Ltd.,** Belgrave Electrical Works, Leeds.—The September register of surplus new and second-hand electrical material.

**Griffin & Tatlock, Ltd.,** Kemble Street, London, W.C.2.—Leaflet G.T.1325 describing electro-technical analysis apparatus developed specially to meet the heavy wartime demand.

**British Central Electrical Co., Ltd.,** 6 & 8, Rosebery Avenue, London, E.C.1.—Leaflet 144/2/41 dealing with the "Fulload" earth tester.

# TRADE MARK APPLICATIONS

THE following applications have been made for British trade marks. Objections to any of them may be entered within one month from the dates given :—

**September 3rd.**—GLOVEEN. No. 614737, Class 9. Covered electric wire. Glovers (Thread Coverers), Ltd., Grove Road, Castle Boulevard, Nottingham.

FLEXILANT. Nos. 614996 and 614997 (design), Class 17. Articles of india-rubber not included in other classes, and electric insulation parts. Rubber Bonders, Ltd., Watling Street, Dunstable.

**September 10th.**—HIQOR. No. B614,554, Class 9. Magnetic cores, being parts of electrical apparatus. Telephone Manufacturing Co., Ltd., Hollingsworth Works, Martell Road, West Dulwich, London, S.E.21.

# INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

CURTIS LIGHTING COMPANY present address.

BURGOYNE boiling ring.

# ELECTRICITY SUPPLY

## *Co-ordination in Ulster. Sydney Results.*

**Blackburn.**—SUPPLY FOR ELECTRODE BOILERS.—An application has been received by the Corporation for an increased supply of electricity for two 350-kW electrode boilers. The borough electrical engineer has submitted an estimate of £850, the cost of giving the supply which the Council has decided to provide under the standard off-peak tariff. The Council has also authorised the modification of stock switchgear and the purchase of a 750-kVA transformer.

**Bradford.** — SHELTER INSTALLATIONS. — The Corporation Emergency Committee reports having received instructions to install electric lighting in certain roadside shelters, surface shelters and rest and feeding centres and also to install thermostatically controlled electric heating in 40 shelters.

**Northern Ireland.**—NEW ELECTRICITY AUTHORITY ?—Recent questions regarding the possibility of the Belfast electricity undertaking being transferred to control outside the Corporation are explained in the report, presented to the City Council at its last meeting, of a conference between the town clerk, city electrical engineer, city treasurer and the Parliamentary Secretary to the Ministry of Commerce, when plans for emergency power supplies were discussed.

The Corporation's officers suggested that the discussions should be on the basis of a new body which it was proposed to set up being representative of the local authorities of Northern Ireland, with the addition of a representative of the Ministry, and that the Corporation, as the owners of the largest undertaking to be absorbed, should have majority representation. The finances of the new body should be secured by the different local authorities in proportion to their respective poor-law valuations and it should be bound by provisions similar to the "Aberdeen clause" in various Acts of Parliament. Surplus profits should be distributed on the same basis, subject to conditions contained in present Acts of Parliament.

On behalf of the Ministry it was stated that these proposals could not be agreed to as the Government, while prepared to give local authorities a certain measure of representation (three Corporation representatives out of seven) wished the new body to be a separate board independent of local authorities, and it was prepared to finance the new undertaking. The Government must, therefore, have majority representation.

No answer had yet been received to the question whether it was the intention of the Government to take over the Council's electricity undertaking. If and when this intention was intimated it was suggested that future discussions should be on a commercial basis. After receiving that report the sub-committee of the Electricity Committee which has been dealing with the question decided that the best interests of supply could be served during the emergency by adhering to the Committee's decision of May last. Then it was recommended that if the Government should decide to proceed with the scheme for transferring plant from Belfast for erection on a distant site the Council should not offer any opposition but should place the resources of the Corporation at the Government's disposal on certain conditions.

**Plymouth.**—FANS FOR WARDENS' POSTS.—The Town Council is to spend £1,165 on the installation of exhaust ventilating fans at wardens' posts.

**Scarborough.**—TRANSFORMERS.—In order to improve the electricity supply in the Cayton and Burniston areas the Electricity Committee is to replace the 50-kVA transformers in these areas with 100-kVA units at a cost of £297.

AIR-RAID SHELTER INSTALLATIONS. — The Town Council is to supply electricity for heating and lighting school shelters at Scarborough for the North Riding Education Committee.

**Worcester.**—PROPOSAL TO REDUCE DISCOUNT WITHDRAWN.—At the recent meeting of the City Council Alderman A. Bryan, chairman of the Electricity Committee, asked permission to withdraw the recommendation for a reduction in the prompt-payment discount from 10 to 5 per cent. for it to be reconsidered by the Committee. He replied in the affirmative when asked whether this action was taken because of "official reasons in London."

## I.E.E. Students

THE South Midland Students' Section of the Institution of Electrical Engineers is holding a tea-dance at the Botanical Gardens, Edgbaston, Birmingham, on September 27th from 3 to 8 p.m. Tickets, 4s. each, can be obtained from the hon. assistant secretary, Mr. I. F. Watt, 46, Broomfield, Smethwick, Staffs. The Section's opening meeting of the session was held last Monday, the subject of the address by the chairman (Mr. J. C. Grant) being "Short Circuit Currents in AC High Power Systems."

On October 13th Dr. W. G. Radley is to deliver an address to the London Students' Section on "Telecommunications of the Future."

## Overseas

**Australia.**—PROGRESS IN SYDNEY.—During 1940 the Sydney County Council sold 697.8 million kWh, an increase of 64.4 million kWh on the 1939 total. Revenue amounted to £3,444,181 (against £3,205,181) and there was a proportionate rise in working expenses. Total expenditure per kWh sold remained at the 1939 figure of 1.195d., but the average price charged to consumers decreased from 1.215d. to 1.185d.

**New Zealand.**—LARGE INCREASE IN OUTPUT.—During the year ended March 31st last supply authorities purchased 1,483.7 million kWh from the main Government substations, an increase of 162.3 million kWh, or 12 per cent., on the 1939-40 aggregate.

**United States.**—FINANCING T.V.A. CONSTRUCTION.—The Senate has approved a House Bill granting $40 million to the Tennessee Valley Authority for use in the current fiscal year on the construction of additional generating facilities. Four dams to be built on tributaries of the Tennessee River are to be known as the Chatuge,

Notely, Ocoee No. 3 and Appalachia projects. Additional turbines are also to be provided at existing plants.

## RADIO & TELEPHONY

**Great Britain.**—REPAIR OF STORM DAMAGE.—An idea of the magnitude of the damage and dislocation caused to L.N.E. Railway telegraph and telephone services by the blizzard that raged in North-East England last February is revealed by the fact that the work of repair has only just been finally completed. No less than 10,000 insulators and 4,000 miles of copper wire were required for the job of repair, which has been carried out continuously since February by the L.N.E.R. Engineer's Department assisted by the military authorities.

**Sweden.**—AUTOMATIC TELEPHONY.—The work of converting the Swedish telephone system from manual to automatic operation was commenced rather late, but has proceeded at an accelerated rate during recent years. With the recent conversion of the central exchange in Västerås, more than half of the 890,000 telephones in Sweden are now connected for automatic service, although the number of central exchanges working on the automatic system is only 23 out of a total of 128.

**United States.**—NEW RADIO RESEARCH LABORATORIES.—According to *Broadcasting*, Mr. David Sarnoff, of the Radio Corporation of America, has recently announced that what will be the largest laboratories in the world devoted to radio-electric research work are to be established at Princetown, New Jersey. The new establishment will not only be devoted to work connected with the growing needs of national defence, but also to short-wave transmission, television and facsimile services. The buildings to be erected will comprise laboratories, workshops, an auditorium and two libraries.

SUPPLY COMPANY'S RADIO SERVICE.—To enable cable faults to be rapidly attended to the San Diego Gas and Electric Co., California, has installed a 250-W transmitter of the frequency modulation type, said to be the first of its kind built on the Pacific Coast. It will cover a radius of 50 miles and work in conjunction with service vehicles equipped with 25-W transmitting and receiving sets.

# Water Power in Scotland

## *Grampian Company's Scheme Rejected*

LAST week the House of Commons declined to give a second reading to the Grampian Electricity Supply Order Confirmation Bill which was designed to authorise the Grampian Electricity Supply Co. to erect hydro-electric power stations in Glen Affric and Glen Cannich, Inverness-shire.

The rejection was moved by Mr. Keeling who said that the scheme militated against post-war planning and would spoil the natural beauties of the area. The proposed charges would be too high for domestic consumers or new industries and he maintained that the Highlanders could only be helped to use their natural water-power asset by the erection of small individual plants which would not necessitate the construction of large reservoirs or large-scale transmission lines.

The chairman of the Parliamentary Commissioners who held an inquiry into the company's application (Major Neven-Spence) said that the House should uphold the findings of its own Commission and allow the Bill to proceed. The Bill would enable construction to be started immediately after the war upon a scheme which would be necessary and ultimately of the utmost benefit to Scotland. Mr. Buchanan thought that the company should bring the proposals before Parliament again after the war when the House would be able to examine them under more suitable conditions.

Mr. Craik Henderson held that the Bill was "innocent and innocuous." The demand upon the company would eventually exceed the supply and it would be failing in its duty if it did not look forward to future needs. The House would be taking a grave responsibility if it departed from the procedure which had been in operation for the past forty-two years. The arguments that the scheme would spoil the amenities of the district had been greatly exaggerated.

The Secretary of State for Scotland (Mr. T. Johnston) said that apart from the objections which had been advanced against the Bill there was a wider principle to be considered. It was clear that the scheme could not be proceeded with during the war as neither materials nor labour would be available. He therefore asked the House to consider whether it ought to proceed with a measure which could not be operated at present or in the visible future and would confer upon a private corporation valuable natural resources and assets and tie the hands of the Government of the day when the whole question of the ownership of hydro-electric resources came to be considered.

There was no reason to assume that Parliament would delay its decision on this general question until after the war or would delay until then its decisions as to the future planning of other natural resources such as water supply, gas undertakings and the location of industry. Arrangements were being made for the preparation of schemes to deal with these matters and an announcement would be made within the next few days. He concluded by advising the House to reject the Bill and after further debate the motion for rejection was agreed to without a division.

# FINANCIAL SECTION

## *Company News. Stock Exchange Activities.*

## Reports and Dividends

**The Atlas Electric and General Trust, Ltd.,** reports that revenue for the year ended March 31st last, amounted to £281,874 as compared with £303,450 in the previous year. After charging U.K. taxation (£108,306 against £98,004), together with interest and expenses, there was a net revenue of £133,949 which, with £125,226 brought forward, makes £259,175. The 7 per cent. preference dividend takes £111,781, and £147,394 is carried forward, no dividend being proposed on the ordinary shares, the last distribution on which was 1 per cent. in 1932. The gross receipts of the subsidiary, Sociedad Comercial de Montevideo for the past year were (Uruguay) $4,488,811 against $4,548,027. The loss for the year, before providing for depreciation and renewals, was $235,868 compared with $169,819, raising the debit balance carried forward to $1,351,270. Negotiations with the Government and municipal authorities are continuing.

**Pye, Ltd.,** reports a profit for the year to March 31st last, of £102,415 (against £105,501). The dividend on the deferred stock, already announced, is maintained at 25 per cent. and absorbs £23,150 (£26,622), while the participating preferred stock again receives a further 2 per cent., making 10 per cent. for the year, which takes £8,062 (£8,850). Tax allocation is £50,000 (£40,000) and new charges are £3,750 for war damage contributions and £1,000 for employees' active service fund. A sum of £1,225 (£2,295) is charged to commission for the year ended March 31st, 1940, and the carry-forward is raised from £83,413 to £98,641.

**The Aluminium Corporation, Ltd.,** reports a profit for the past year of £46,637, after meeting depreciation, excess profits tax, etc., against £44,466 for 1939. A balance of £6,080 is carried forward after payment of loan interest, income debenture interest for 1935, directors' fees and income tax. Interest on the 7 per cent. cumulative income mortgage debentures is in arrears for five years; no dividend has yet been paid on the ordinary shares (£75,000).

**The Lincolnshire & Central Electric Supply Co. Ltd.,** reports a net profit for the year ended March 31st amounting to £45,776. This compares with £50,055. Preference dividends require £11,250 (same) and £2,500 (same) is transferred to reserve. The ordinary dividend is maintained at 9 per cent. and £19,841 (£22,105) is carried forward.

**Venner Time Switches, Ltd.,** are to defer consideration of the dividend on the 8 per cent. cumulative preference shares due on September 30th until the accounts for 1941 are available. The dividend on these shares is in arrears since April 1st, 1940.

**The Compania Hispano Americana de Electricidad (Chade)** reports a net profit for 1940–41 of 28,800,000 gold pesetas, as compared with 25,100,000 for 1939–40. It is proposed to pay dividends of 60 pesetas on the "A," "B" and "C" shares, and 12 pesetas on the "D" and "E" shares.

**British Insulated Cables, Ltd.,** has declared an interim dividend on the ordinary stock of 5 per cent. (same).

**A. Reyrolle & Co., Ltd.,** are again paying an interim dividend of 5 per cent. on their ordinary shares.

**The Lancashire United Transport & Power Co., Ltd.,** is again paying an interim dividend of 4 per cent.

**A. C. Cossor, Ltd.,** have declared a final dividend of 10 per cent., maintaining the distribution for the past year at 15 per cent.

**The Electric Supply Corporation, Ltd.,** is repeating its interim dividend of 3½ per cent.

**Hall Telephone Accessories (1928), Ltd.,** announce an interim dividend of 5 per cent.

**The Automatic Telephone & Electric Co., Ltd.,** is again paying an interim dividend of 3 per cent.

**Associated Fire Alarms, Ltd.,** have declared a dividend of 6 per cent. for the past year (same).

## New Companies

**Tucker Bros., Electrical Engineers (Essex), Ltd.**—Private company. Registered September 9th. Capital, £2,000. Objects: To carry on the business of electricians, electrical, wireless, television, mechanical, automobile and general engineers, etc. Directors: S. M. Tucker, 67, Glebe Way, Hornchurch, Essex; and A. J. Bates, "Ma-Trieve," Nelmes Crescent, Hornchurch. Registered office: Radio House, Station Lane, Hornchurch, Romford, Essex.

**Margrif Engineering Co., Ltd.**—Private company. Registered September 5th. Capital, £1,000. Objects: To acquire the business of an engineer carried on by John Mark, and to carry on the business of manufacturing, mechanical, civil, electrical and general engineers, etc. The subscribers are: J. Wynne, 37, Ingram Road, Thornton Heath, Surrey, and J. E. Way, 35, Frankswood Avenue, Petts Wood, Orpington, Kent. Solicitors: Stephenson Harwood and Tatham, 16, Old Broad Street, E.C.

## Companies' Returns

### Statements of Capital

**British Power & Light Corporation, Ltd.**—Capital £4,000,000 in £1,000,000 6 per cent. preference stock, £600,000 4½ per cent. preference stock, £2,030,000 ordinary stock and 370,000 shares of £1 each. Return dated April 3rd. All stock issued. £2,783,730 paid (£1 on £600,000 6 per cent. preference, 28s. 9d. on £400,000 6 per cent. preference, 21s. on 600,000 4½ per cent. preference, £1 on £554,500 ordinary and 25s. on £339,384 ordinary stock). £1,136,116 considered as paid on £1,136,116 ordinary stock. Mortgages and charges: Nil.

**East Anglian Electric Supply Co., Ltd.**—Capital, £1,000,000 in 40,000 preference and 960,000 ordinary shares of £1. Return dated May 7th. 2,581 preference and 600,000 ordinary

shares taken up. £563,419 paid on 122 preference and 563,297 ordinary shares. £39,162 considered as paid on 2,459 preference and 36,703 ordinary shares. Mortgages and charges : £750,000.

**Electric Supply Corporation, Ltd.**—Capital £750,000 in 431,262 ordinary, 250,000 preference and 68,738 unissued shares of £1. Return dated May 12th. All ordinary and preference shares taken up. £529,000 paid on 279,000 ordinary and 250,000 preference shares. £152,262 considered as paid on 152,262 ordinary shares. Mortgages and charges: Nil.

**North Lincolnshire & Howdenshire Electricity Co., Ltd.**—Capital, £500,000 in 500,000 ordinary shares of £1 each. Return dated March 31st (filed April 15th). All shares taken up. £480,181 paid. £19,809 considered as paid. Mortgages and charges: Nil.

**Central Sussex Electricity, Ltd.**—Capital, £260,000 in 260,000 ordinary shares of £1 each. Return dated May 12th. All shares taken up. £260,000 paid. Mortgages and charges: Nil.

**Burgess Hill Electricity, Ltd.**—Capital, £65,000 in £1 shares. Return dated May 12th. 52,250 shares taken up. £50,400 paid. £1,850 considered as paid. Mortgages and charges: Nil.

**Dunoon & District Electricity Supply Co., Ltd.**—Capital £200,000 in £1 shares. Return dated May 13th. 160,000 shares taken up. £160,000 paid. Mortgages and charges: Nil.

**Jarrow & District Electric Traction Co., Ltd.**—Capital, £60,000 in £1 shares. Return dated May 8th. 59,934 shares taken up. £49,945 paid. £9,989 considered as paid. Mortgages and charges: Nil.

**Yorkshire Woollen District Transport Co., Ltd.**—Capital, £550,000 in 550,000 shares of £1 each. Return dated April 30th (filed May 9th). 528,000 shares taken up. £220,000 paid. £308,000 considered as paid. Mortgages and charges: Nil.

**W. T. Glover & Co., Ltd.**—Capital £500,000 in 100,000 preference and 400,000 ordinary shares of £1 each. Return dated May 8th. 100,000 preference and 344,550 ordinary shares taken up. £117,000 paid, £327,550 considered as paid. Mortgages and charges: Nil.

**Crampton & Co., Ltd.**—Capital £2,500 in £1 shares. Return dated May 9th. All shares taken up. £2,500 paid. Mortgages and charges: Nil.

**Cambridge Electric Supply Co., Ltd.**—Capital £600,000 in £1 shares. Return dated May 9th. 500,000 shares taken up. £500,000 paid. Mortgages and charges: £30,000.

**L. E. Wilson & Co., Ltd.**—Capital, £2,000 in £1 shares. Return dated May 7th. 1,602 shares taken up. £1,602 paid. Mortgages and charges: £2,906 4s.

## Mortgages and Charges

**Criterion Electric, Ltd.**—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated August 15th, 1941, to secure £900. Holder: Salomon Tepper, 55, Sudbury Court Road, Harrow.

# Bankruptcies

**G. A. Weston,** electrical contractor and engineer, 5-6, Roman Wall House, Crutched Friars, E.C.—The first meeting of creditors was held on September 3rd at London Bankruptcy Buildings. The receiving order was made on the petition of the General Electric Co., Ltd., judgment creditors for £153. It appeared that the debtor had not yet attended at the Department and was believed to be in the country working for the Air Ministry. The case was left in the hands of the Official Receiver.

# Liquidations

**Park Royal Engineering Co., Ltd.**—Winding up voluntarily. Liquidator: Sir Laurence E. Halsey, of Price, Waterhouse & Co., 3, Frederick's Place, Old Jewry, London, E.C.2.

# Electrical Manufacture in Canada

STATISTICS relating to the manufacture of electrical apparatus and supplies in Canada during 1939 have recently been released in Ottawa. They show that production of such goods has been well maintained. The value was approximately $100,000,000, of which $89,060,000 represents goods made in the electrical apparatus and supplies industry. There is a certain amount of electrical manufacture by firms engaged mainly in other industries, *e.g.*, accessories for automobile and household use amounting in value to $16,600,000. The aggregate production compares with imports totalling $13,752,000 in value in 1939, an increase of $700,000 on 1938, while the value of exports of Canadian electrical apparatus and supplies declined to $3,229,000 against $4,114,000.

The accompanying table shows the values of the principal types of equipment manufactured in 1939 with a note of increase or decrease compared with 1938. Included in the figure for wires and cables is $2,438,000 representing bare copper wire, other leading items being braided rubber-insulated, weatherproof, and rubber- or paper-insulated telephone wire and cable. It will be noted that this group has the highest value after the motor, generator and transformer group and shows the largest increase on the year. Of the motors made nearly one-third consisted of units of ¼ HP and under, single-phase, AC. Of the batteries turned out 40 per cent. were for motor engine starting and ignition, next in importance being those for radio.

| | 1939 ($000) | Inc. or dec. on 1938 |
|---|---|---|
| Motors, generators and transformers | 30,006 | — 3,601 |
| Wires and cables, not including aluminium | 14,578 | + 1,952 |
| Refrigerators | 7,538 | — 368 |
| Batteries and parts | 7,105 | + 896 |
| Telephone material | 4,687 | — 937 |
| Lamps | 3,420 | — 580 |
| Washing machines | 4,549 | — 4 |
| Stoves, ranges and hot-plates | 2,815 | + 233 |
| Electric signs | 1,412 | — 61 |
| Automobile generators and starters | 1,486 | + 119 |

Of the 190 firms making up the electrical apparatus and supplies industry no fewer than 140 were situated in Ontario. They employed monthly an average of 20,261 people who were paid $25,711,000 in salaries and wages.

# CONTROL by

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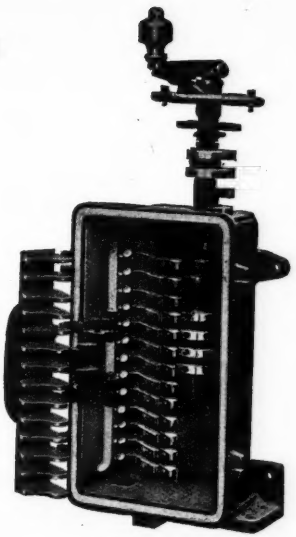

Drum type Reversing Controller

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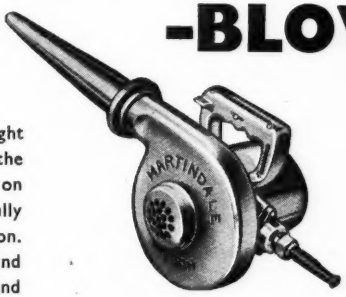
MARTINDALE

# "SUPER -BLOWERS"




The most efficient lightweight portable blowers ever put on the market. Precision-built, on interchangeable lines, carefully balanced to eliminate vibration. Armatures and coils hand-wound and impregnated to withstand all conditions of service all over the world.

Write for literature.

Three models (1) "Mill-type"
(2) Standard
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All models can be instantly converted into powerful industrial vacuum cleaners.

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# ALL IN ONE BASKET

## (But it is a very good basket)

We have successfully defied the proverb for nearly sixty years by putting all our eggs in one basket—in other words, by specialising in doing one thing.

Our business is very largely the manufacture of electric motors and allied machines. We have very little to fall back on if that business should fail, so we take good care that our basket—our reputation for making well-designed and well-built machines—is kept in good repair. We intend to make it even bigger and stronger in the years to come.

## LAURENCE, SCOTT & ELECTROMOTORS LIMITED

*Makers of electric motors since 1883*

NORWICH, MANCHESTER, LONDON & BRANCHES

# STOCKS AND SHARES

TUESDAY EVENING.

THE Government's policy of cheap money and the hint of the Chancellor of the Exchequer to the effect that, if sufficient money is subscribed to war loans, a further increase in income-tax next year may be avoided, have led to cheerful markets in the Stock Exchange, with rising prices in most departments.

Rising prices are the best advertisement that the House can have; and with the avowed intention of the Treasury to keep money rates low, investment is constantly concerned with the problem of getting a higher rate of interest than that afforded by National War Bonds, in order to raise the average yield upon capital.

**Electricity Supply**

It will be noticed that most of the electricity supply companies have declared interim dividends similar to those of a year ago. From this, the inference is that the final dividends for the year will also be unchanged. Proceeding on this assumption, investment is accumulating all the shares which come to market, however slender the yield on them may appear to be. Reference to our tables will indicate the willingness of capital, nowadays, to accept 4¼ to 4½ per cent. on such gilt-edged ordinary shares as those in this department have every claim to be considered.

The prices of ordinary shares continue to advance and every week improvements also take place in the preference issues. Electrical Distribution of Yorkshire ordinary have hardened to 40s. 4d. and Edmundson's ordinary to 27s. 6d. Half a score of others are better. In the overseas group, Kalgoorlie ordinary 10s. shares at 13s. 6d. are 1s. up. Tokyo Electric sixes put on a further 4 points, following last week's gain of 3. Possibilities of a rupture being averted between the United States and Japan have led to Japanese issues rising generally.

**Shares on Offer**

Of the comparatively small number of shares which are available for purchase in the market for Home electricity supply ordinary issues, mention may be made of 2,000 Edmundsons at 27s. 9d. and the same number of Clyde Valley Electrical at 38s. 3d. ex dividend. The yield on Edmundsons at the price mentioned is £4 6s. 6d.; on Clyde Valley £4 3s. 6d., assuming the maintenance, of course, of the previously paid dividends of 6 per cent. and 8 per cent. respectively. Five thousand Midland Counties ordinary can be obtained at the same price as Clyde Valleys. The dividend and yield are the same in both cases. For a better return, Lancashire Electric ordinary deserve notice at 33s. 6d., yielding £4 9s. 6d. per cent. on the basis of the 7½ per cent. dividend paid in the past few years. County of London ordinary at 36s. ex dividend, give a return of £4 9s. 0d. per cent. on the 8 per cent. dividend declared for 1940, which went against 10½ per cent. in several preceding years.

Preference shares in the companies of this group are obtainable at prices which provide an average return of little more than 4 per cent. on the money. An exception is provided by Llanelly & District 6 per cent. new preference, which are on offer at 26s. 6d. to pay 4½ per cent. The dividend is due in February and August: next February, the dividend on these new preference shares will be approximately 6d. per share.

**Equipment and Manufacturing**

There has been a fair amount of absorption lately of Crompton Parkinson 5s. "A" ordinary shares, the assumption being that for the year which ends on September 20th the company will be able to repeat the dividend of 20 per cent. paid in each of the past two years. A few thousand shares can be bought at 20s. 6d.; and, on the 20 per cent. dividend basis, the yield would be £4 17s. 6d. The interim dividend of 7½ per cent. was the same as that for the corresponding period of last year. English Electric ordinary at 35s. 9d. yield £5 11s. 9d.; General Electrics at 80s. pay £4 7s. 6d., and A. Reyrolle at 57s. give a similar return. Consolidated Signal £1 shares at 76s. yield about 4½ per cent. By way of comparison, Thomas Tilling £1 ordinary shares at 46s. 9d. afford £4 5s. 6d. and Provincial Traction 4s. ordinary shares can be bought at their par prices to pay 7 per cent. on the money, these yields being calculated, in every case of course, on the basis of the last-paid dividends. Thorn Electrical 5s. ordinary at 10s. ex dividend and the 6 per cent. preference at 18s. attracted investment as a result of the chairman's speech at last week's meeting.

**British Insulated**

British Insulated Cables at 90s. give a return of practically 4½ per cent. on the money, allowing for the inclusion in the price of the interim dividend of 5 per cent. declared last week. The company for the past six years has paid a final of 10 per cent. and a bonus of 5 per cent., making 20 per cent. for the year and showing a handsome surplus after distribution of this rate. The company has entered upon its second half-century of existence. In 1902 the British Insulated Wire Co., Ltd., as it then was, acquired the business of the Telegraph Manufacturing Co., Ltd. (The shares are still nicknamed "Wires" in the Stock Exchange.) Some years later, the company sold the Liverpool works and business to the Automatic Telephone Manufacturing Co. Amongst the latest acquisitions were the Croydon Cable Works, Ltd., and

(*Concluded on page* 283)

# ELECTRICAL INVESTMENTS

## *Prices, Dividends and Yields*

| Company | Dividend 1939–40 | Dividend 1940–41 | Middle Price Sept. 16 | Rise or Fall | Yield £ s. d. |
|---|---|---|---|---|---|
| **Home Electricity Companies** | | | | | |
| Bournemouth and Poole | 15 | 12½ | 52/6 | +⅛ | 4 15 5 |
| British Power and Light | 7 | 6 | 25/-xd | +3d. | 4 16 0 |
| City of London | 7½ | 7 | 25/9 | .. | 5 8 9 |
| Clyde Valley | 8 | 8 | 37/6xd | +6d. | 4 5 4 |
| County of London | 10½ | 8 | 35/9 | +9d. | 4 9 5 |
| Edmundson's: | | | | | |
| 7% Pref. | 7 | 7 | 32/6 | .. | 4 6 2 |
| Ord. | 6 | 6 | 27/6 | +6d. | 4 7 3 |
| Elec. Dis. Yorkshire | 9 | 9 | 40/- | +⅛ | 4 10 0 |
| Elec. Fin. and Securities | 12½ | 12½ | 42/6 | .. | 5 17 8 |
| Elec. Supply Corporation | 11½ | 10 | 42/6 | +⅛ | 4 14 0 |
| Isle of Thanet | 2 | Nil | 8/6 | .. | — |
| Lancs Light and Power | 7½ | 7½ | 33/9 | +6d. | 4 9 0 |
| Llanelly Elec. | 5½ | 5½ | 21/- | .. | 5 4 9 |
| Lond. Assoc. Electric | 5½ | 4½ | 19/6 | .. | 4 12 4 |
| London Electric | 7 | 7 | 24/6 | +9d. | 5 14 3 |
| London Power Deb. Red. | 5 | 5 | 103xd | .. | 4 17 2 |
| Metropolitan | 10 | 8 | 36/3 | +⅛ | 4 8 5 |
| Midland Counties | 8 | 8 | 37/6 | .. | 4 5 4 |
| Mid. Elec. Power | 9 | 9 | 37/6 | .. | 4 16 0 |
| Newcastle Elec. | 7 | 7 | 27/6 | .. | 5 1 10 |
| North Eastern Elec.: | | | | | |
| Ordinary | 7 | 7 | 29/6 | .. | 4 15 0 |
| 7% Pref. | 7 | 7 | 33/3 | .. | 4 4 2 |
| Northampton | 10 | 10 | 44/6 | +9d. | 4 10 0 |
| Notting Hill 6% Pref. (£10) | 6 | 6 | 8½ | .. | — |
| Northmet Power: | | | | | |
| Ordinary | 10 | 7 | 35/- | .. | 4 0 0 |
| 6% Pref. | 6 | 6 | 29/6 | .. | 4 1 4 |
| Richmond Elec. | 6 | 6 | 22/6 | .. | 5 6 8 |
| Scottish Power | 8 | 8 | 38/3 | .. | 4 3 4 |
| Southern Areas | 5 | 5 | 17/6 | .. | 5 14 3 |
| South London | 7 | 7 | 23/6 | .. | 5 19 2 |
| West Devon | 5 | 5 | 21/3 | .. | 4 14 1 |
| West Glos. | 4½ | 4½ | 18/3 | .. | 4 18 8 |
| Yorkshire Elec. | 8 | 8 | 38/9 | +6d. | 4 2 8 |
| **Overseas Electricity Companies** | | | | | |
| Atlas Elec. | Nil | Nil | 3/3 | +3d. | — |
| Calcutta Elec. | 8* | 7* | 37/- | .. | 3 15 9 |
| Cawnpore Elec. | 10 | 10 | 28/3 | .. | 7 1 7 |
| East African Power | 7 | 7 | 25/9xd | +6d. | 5 8 9 |
| Jerusalem Elec. | 7 | 5 | 18/9 | .. | 5 6 8 |
| Kalgoorlie (10/-) | 7½ | 7½ | 13/6 | +1/- | 5 13 2 |
| Madras Elec. | 6* | 4* | 21/3 | .. | 3 15 1 |
| Montreal Power | 1½ | 1½ | 26½ | .. | 6 2 5 |
| Palestine Elec. "A" | Nil | Nil | 18/3 | .. | — |
| Perak Hydro-elec. | 2½ | 6 | 17/6 | .. | 6 17 2 |
| Shawinigan Power | 83cts. | 90cts. | 16 | .. | — |
| Tokyo Elec. 6% | 6 | 6 | 36½ | +4 | 16 8 8 |
| Victoria Falls Power | 15 | 15 | 80/- | .. | 3 15 0 |
| Whitehall Inv. Pref. | 7½ | 7½ | 13/9 | .. | 10 18 2 |
| **Public Boards** | | | | | |
| Central Electricity: | | | | | |
| 1950–70 | 5 | 5 | 110 | .. | 4 11 1 |
| 1955–75 | 5* | 5 | 113 | .. | 4 8 6 |
| 1951–73 | 4½ | 4½ | 107 | .. | 4 4 1 |
| 1963–93 | 3½ | 3½ | 102½ | +2 | 3 8 4 |
| 1974–94 | 3½ | 3½ | 94 | +1 | 3 9 2 |
| London Elec. Trans. Ltd. | 2½ | 2½ | 94 | .. | 2 13 2 |
| London & Home Counties 1955–75 | 4½ | 4½ | 106½ | .. | 4 4 6 |
| Lond. Pass. Trans.: | | | | | |
| A | 4½ | 4½ | 113½ | .. | 3 19 4 |
| B | 5 | 5 | 111½ | .. | 4 9 8 |
| C | 1½ | 3 | 42 | .. | 7 2 10 |
| West Midlands J.E.A. 1948–68 | 5 | 5 | 108½ | .. | 4 12 0 |
| **Telegraph and Telephone** | | | | | |
| Anglo-Am. Tel.: | | | | | |
| Pref. | 6 | 6 | 107½ | .. | 5 11 9 |
| Def. | 1½ | 1½ | 24½ | .. | 6 2 5 |
| Anglo-Portuguese | 8 | 8 | 15/- | .. | 10 13 4 |
| Cable & Wireless: | | | | | |
| 5½% Pref. | 4½ | 5½ | 103 | .. | 5 6 10 |
| Ord. | 4 | 4 | 62½ | +½ | 6 8 0 |
| Canadian Marconi $1 | Nil | 4cts. | 6/- | −3d. | 3 6 0 |
| Globe Tel. & Tel.: | | | | | |
| Ord. | 8½* | 8½* | 28/9 | .. | — |
| Pref. | 6 | 6 | 27/6 | .. | 4 7 3 |
| Great Northern Tel. (£10) | 20 | 20 | 14 | +½ | — |
| Inter. Tel. & Tel. | Nil | Nil | 3 | .. | — |
| Marconi-Marine | 7½ | 7½ | 27/6 | .. | 5 9 1 |
| Oriental Tel. Ord. | 11½* | 16 | 3⅝ | +⅛ | 4 8 6 |
| Telephone Props. | 6 | 6 | 11/3 | .. | 10 13 4 |
| Tele. Rentals (5/-) | 10 | 10 | 8/9 | +9d. | 5 14 3 |
| **Traction and Transport** | | | | | |
| Anglo. Arg. Trams: | | | | | |
| First Pref. (£5) | Nil | Nil | 2/- | .. | — |
| 4% Inc. | Nil | Nil | 4½ | .. | — |
| Brit. Elec. Traction: | | | | | |
| Def. Ord. | 45 | 45 | 885 | .. | 5 1 8 |
| Pref. Ord. | 8 | 8 | 170 | .. | 4 14 2 |
| Bristol Trams | 8* | 8 | 41/3 | .. | 3 17 8 |
| Brazil Traction | $1 | 50c. | 11⅜ | +⅜ | — |
| Calcutta Trams | 8 | 5½ | 23/9 | .. | 4 12 7 |
| Cape Elec. Trams. | 5 | 5 | 18/- | +1/- | 5 11 1 |
| Lancs Transport | 10 | 10 | 42/6 | .. | 4 14 1 |
| Mexican Light: | | | | | |
| 1st Bonds | 5 | 5 | 50 | +5 | — |
| Rio 5% Bonds | 5 | 5 | 85 | .. | 5 17 8 |
| Southern Rly.: | | | | | |
| 5% Prefd. | 5 | 5 | 64½ | +1 | 7 15 0 |
| 5% Pref. | 5 | 5 | 97½ | +1 | 5 2 7 |
| T. Tilling | 10 | 10 | 46/3 | .. | 4 6 7 |
| Tilling & B.A. | 8* | 7* | 52/6 | .. | 2 13 4 |
| West Riding | 10 | 10 | 39/- | .. | 5 2 7 |

(*Continued on next page*)

* Dividends are paid free of Income Tax.

| Company | Dividend 1939–40 | Dividend 1940–41 | Middle Price Sept. 16 | Rise or Fall | Yield p.c. |
|---|---|---|---|---|---|
| **Equipment and Manufacturing** | | | | | |
| | | | £ s. d. | | |
| Aron Elec. Ord. .. | Nil | 7½ | 22/– | +1/– | 6 16 4 |
| Assoc. Elec.: | | | | | |
| Ord. .. .. | 10 | 10 | 42/6 | .. | 4 14 3 |
| Pref. .. .. | 8 | 8 | 36/3 | .. | 4 8 5 |
| Automatic Tel.& El. | 12½ | 12½ | 46/3 | .. | 5 8 3 |
| Babcock & Wilcox | 11 | 11 | 45/9 | +⅛ | 4 16 0 |
| British Aluminium | 12½ | 10 | 46/3 | −⅛ | 4 6 6 |
| British Insul. Ord... | 20 | 20 | 90/– | .. | 4 9 0 |
| British Thermostat (5/-) .. .. | 18½ | 18½ | 12/6 | .. | 7 8 0 |
| British Vac. Cleaner (5/-) .. .. | 40 | 12½ | 8/3 | .. | 7 11 6 |
| Brush Ord... .. | Nil | Nil | 4/– | .. | — |
| Callender's .. | 15 | 15 | 70/– | +½ | 4 5 9 |
| Chloride Elec. Storage | 15 | 15 | 65/– | .. | 4 12 4 |
| Consolidated Signal | 17 | 17 | 75/– | .. | 4 10 10 |
| Crabtree (10/-) .. | 17½ | 17½ | 27/6 | .. | 6 7 4 |
| Crompton Parkinson Ord. (5/-) .. | 30 | 20 | 19/6 | .. | 5 2 8 |
| E. K. Cole (5/-) .. | 10 | Nil | 6/9 | .. | — |
| E.M.I. (10/-) .. | 5 | Nil | 12/9 | +6d. | — |
| Electric Construction | 10½ | 10 | 32/6 | .. | 6 3 0 |
| Enfield Cable Ord. | 16½ | 12½ | 51/3 | .. | 4 17 6 |
| Elecl. Switchgear (10/-) .. .. | 16 | 10 | 20/– | .. | 5 0 0 |
| English Electric .. | 10 | 10 | 35/– | .. | 5 14 2 |
| Ensign Lamps (5/-) | 25 | 25 | 16/3 | .. | 7 13 10 |
| Ericsson Tel. (5/-) .. | 25* | 22* | 37/6 | .. | 2 18 8 |
| Ever Ready (5/-) .. | 40 | 40 | 28/3 | .. | 7 1 7 |
| Falk Stadelmann .. | 7 | 7½ | 17/6 | .. | 8 11 6 |
| Ferranti Pref. .. | 7 | 7 | 26/3 | .. | 5 6 10 |
| G.E.C.: | | | | | |
| Pref. .. .. | 6½ | 6½ | 32/6 | .. | 4 0 0 |
| Ord. .. .. | 20 | 17½ | 80/– | .. | 4 7 6 |
| Greenwood & Batley | 15 | 13 | 22/6 | .. | 11 11 2 |
| Hall Telephone(10/-) | 15 | 10 | 13/9 | .. | 7 5 6 |
| Henley's (5/-) .. | 20 | 20 | 21/3 | .. | 4 14 1 |
| 4½% Pref. .. | 4½ | 4½ | 21/3 | .. | 4 4 8 |
| Hopkinsons .. | 15 | 15 | 45/9 | +⅛ | 6 11 0 |
| India-Rubber Pref. | 5½ | 5½ | 21/3 | .. | 5 3 6 |
| Intl. Combustion .. | 32½ | 30 | 105/– | .. | 5 14 3 |
| J. Lucas .. .. | 15 | 15 | 61/3 | .. | 4 18 0 |
| Johnson & Phillips | 15 | 15 | 51/3 | .. | 5 18 10 |
| Lancashire Dynamo | 20 | 20 | 57/6 | .. | 6 19 0 |
| Laurence, Scott (5/-) | 15 | 15 | 10/9 | .. | 6 19 6 |
| London Elec. Wire | 7½ | 7½ | 22/6 | .. | 6 13 4 |
| Mather & Platt .. | 13½ | 10 | 43/9 | .. | 4 12 6 |
| Metropolitan Elec. Cable Pref. .. | 5½ | 5½ | 21/3 | .. | 5 3 6 |
| Murex .. .. | 20 | 20 | 88/9 | −⅛ | 4 10 1 |
| Pye Deferred (5/-).. | 25 | 25 | 13/9xd | +9d. | 9 1 10 |
| Revo (10/-) .. | 5 | 20 | 23/9 | .. | 8 8 5 |
| Reyrolle .. .. | 12½ | 12½ | 55/– | .. | 4 10 3 |
| Siemens Ord. .. | 7½ | 7½ | 23/9 | .. | 6 6 4 |
| Strand Elec. (5/-) .. | 4 | 2 | 3/– | .. | 3 6 8 |
| S. Smith (4/-) .. | 37½ | 50 | 7/– | .. | 7 2 10 |
| Switchgear & Cowans (5/-) .. .. | 10 | 15 | 8/9 | .. | 8 11 6 |
| Tel. Condenser (10/-) | Nil | 5 | 11/3 | .. | 4 9 0 |
| T.C. & M. .. .. | 10 | 10 | 41/3 | .. | 4 17 0 |
| Telephone Mfg. (5/-) | 9 | 9 | 8/3 | +3d. | 5 9 1 |
| Tube Investments.. | 23¾ | 23¾ | 95/– | .. | 5 0 0 |
| Vactric (5/–) .. | 4 | Nil | 3/– | .. | — |
| Vickers (10/– .. | 10 | 10 | 17/3 | +9d. | 5 16 0 |
| Ward & Goldstone (5/-) .. .. | 20 | 20 | 16/6 | .. | 5 19 9 |
| Westinghouse Brake | 17½ | 10 | 47/6 | .. | 4 4 4 |
| Walsall Conduits (4/-) | 55 | 55 | 31/3xd | +6d. | 7 0 9 |
| West, Allen (5/-) .. | 7½ | 7½ | 3/9 | .. | 10 0 0 |

* Dividends are paid free of Income Tax.

## Stocks and Shares (*Concluded from page* 281)

Macintosh Cable Co., Ltd., in 1936, in which year, by the way, the Liverpool Corporation purchased the British Insulated electricity undertaking at Prescot. The company's shares take rank as one of the best-class industrial investments in the list.

### Many Advances

In the demand which prevails for industrial shares, the market in armaments, iron, coal and steel and aircraft shares is not overlooked. Vickers have risen 9d. to 17s. 3d.; Babcock & Wilcox are ⅛ up at 45s. 9d. Improvements have taken place in the shares of most of the other companies in this group. Elsewhere Hopkinsons are better at 45s. 9d., showing a rise of 1s. 3d. Hall Telephone shares are rather harder on announcement of an interim dividend of 5 per cent., payable on October 13th. Last year's 10 per cent. dividend was paid as a first and final. The shares, at 14s., give a return of 7 per cent. on a 10 per cent. dividend for the year. Murex went a trifle easier to 88s. 9d., and British Aluminium at 46s. 9d. are 9d. lower. Amongst the rises, Aron Electric ordinary have advanced to 22s., continuing the improvement which started with the return of the ordinary shares into the dividend list with 7½ per cent. Callender's at 70s. are 2s. 6d. up. In several cases where prices were marked ex dividend ten days ago, the amounts of the deductions have been recovered. Great Northern Telegraphs have risen to 14. Enfields show improvement at 51s. 3d. bid. Speculation is again busy with Electric and Musical Industries, the price at 12s. 9d. being 6d. better on the week.

### Miscellaneous Matters

Cable and Wireless ordinary stock at 62½ shows a gain of the fraction. The preference remains at 103. Oriental Telephones at 3⅞ are 2s. 6d. better. Market expectation of a partial return of capital has already been mentioned. Telephone Rentals and Telephone Manufacturing are better at 8s. 9d. and 8s. 3d. respectively. Midland Electric Manufacturing £1 shares are 5s. better at £5. In the Overseas list, Mexican Light & Power first mortgage bonds at 50 are 5 up. Cape Electric Trams strengthened to 18s., South African industrials, like South African mining shares, being in high favour at the present time.

# NEW PATENTS

## *Electrical Specifications Recently Published*

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications* (1*s. each*) *can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.*2.

**1939**

12780. "Device for modulating a high-frequency oscillation or for amplifying a modulated high-frequency oscillation." Le Transformateur and M. Nikis. April 30th, 1938. (Cognate application 12781/39.) (538982.)

30004. "Electric cables and insulation therefor." Telegraph Construction & Maintenance Co., Ltd., J. N. Dean and J. Webster. November 13th, 1939. (538827.)

30212. "Protective apparatus for electrical distribution networks." Maschinenfabrik Oerlikon. November 17th, 1938. (538864.)

32162. "Electric-filter circuits." Marconi's Wireless Telegraph Co., Ltd., and A. T. Starr. December 13th, 1939. (538946.)

32445. "Television signal-translating systems." Hazeltine Corporation. January 14th, 1939. (Cognate application 32446/39.) (538947.)

**1940**

756. "Construction of primary electric cells." B. T. Hewson and A. Logan. January 12th, 1940. (538831.)

2690. "Method of, and device for, electrically measuring the thickness of foils and sheet metals." L. Urmenyi. February 12th, 1940. (538988.)

2949. "Protective arrangements for the power supply to telephone or like systems." Automatic Telephone & Electric Co., Ltd., and T. Holland. February 16th, 1940. (538840.)

2963. "Means for the suspension of piezo-electric members." Fabrica Italiana Magneti Marelli. February 22nd, 1939. (538989.)

2978. "Arrangements for charging secondary electric batteries." Standard Telephones & Cables, Ltd., and E. A. Richards. February 16th, 1940. (538843.)

2979. "Automatic selecting switches." Standard Telephones & Cables, Ltd. (L. J. J. Schreiber and G.X. Lens). February 16th, 1940. (538844.)

2986. "Photo-sensitive layers, and methods of manufacturing such layers." Baird Television, Ltd., and A. Sommer. February 16th, 1940. (538845.)

3113. "Terminal bushing insulators." Bushing Co., Ltd., and H. E. Winder. February 19th, 1940. (538885.)

3187. "Apparatus for generating electric impulses." Creed & Co., Ltd., A. E. Thompson and R. D. Salmon. February 20th, 1940. (538912.)

3206. "X-ray apparatus." S. Cox, Ltd., and P. G. Sutton. February 20th, 1940. (538955.)

3210. "Shaving apparatus." Philips Lamps, Ltd. February 23rd, 1939. (538916.)

3249. "Headlights." G. Trippe. February 21st, 1940. (538917.)

3250. "Gas turbine plant." Sulzer Frères Soc. Anon. May 10th, 1939. (538956.)

3315. "Refractory linings for pipes or other conduits or narrow chambers." H. da Costa, and Plessey Co., Ltd. February 21st, 1940. (538960.)

3374. "Directional aerial systems." F. Twyman. February 22nd, 1940. (538994.)

4048. "Tubular heat-exchangers." Akt.-Ges. Brown Boveri & Cie. March 15th, 1939. (538965.)

4128. "Control device for lifts." Inventio Akt.-Ges. April 1st, 1939. (538967.)

4865. "Electric circuit interrupters having arc extinguishing devices." Westinghouse Electric International Co. March 22nd, 1939. (538894.)

5472. "Tuned circuits." Marconi's Wireless Telegraph Co., Ltd. March 22nd, 1939. (538921.)

5724. "Valve remote-control apparatus." N. F. Johnston. March 29th, 1940 (Cognate applications 8378/40 and 14915/40). (538923.)

5731. "High-pressure metal-vapour electric-discharge tubes." Philips Lamps, Ltd. April 1st, 1939. (538855.)

6052. "Spot adjusting mechanism for use in, for example, radio transmitters." Marconi's Wireless Telegraph Co., Ltd., and H. J. H. Wassell. April 3rd, 1940. (538898.)

6273. "Apparatus for coating wire or the like with insulating rubber or similar material." D. Bridge & Co., Ltd. (National Rubber Machinery Co.). April 8th, 1940. (538978.)

6528. "Electric resistance heating elements." General Electric Co., Ltd., and L. J. C. Connell. April 11th, 1940. (538924.)

7100. "System and apparatus for automatic facsimile telegraphy." Standard Telephones & Cables, Ltd. April 22nd, 1939. (538928.)

7265. "Radio picture transmission." Marconi's Wireless Telegraph Co., Ltd. April 20th, 1939. (538931.)

7545. "Electrically propelled vehicles." H. G. McClean, and Crompton Parkinson, Ltd. April 26th, 1940. (538933.)

7960. "Spinning regulator for electrically driven ring-spinning machines." Allmänna Svenska Elektriska Aktiebolaget, and A. Johansson. May 3rd, 1940 (Addition to 399384.) (539007.)

8083. "Bearings for rotatable members." British Thomson-Houston Co., Ltd. May 6th, 1939. (538939.)

8084. "Cathode constructions for X-ray tubes." British Thomson-Houston Co., Ltd. May 6th, 1939. (538940.)

8294. "Maintenance of constant voltage in direct-current load circuits." British Thomson-Houston Co., Ltd., and D. J. Mynall. May 8th, 1940. (539009.)

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## Manchester College of Technology

THE 1941-42 session for university courses at the College of Technology, Manchester, opens on September 25th and continues until July 24th, 1942. Students will be enrolled on September 22nd, 23rd and 24th, between 10 a.m. and noon and from 2 p.m. to 4 p.m.

The week-end courses at the College commence on September 20th and the part-time day courses on September 22nd.

# CONTRACT INFORMATION

## *Accepted Tenders and Prospective Electrical Work*

## Contracts Open

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.*

**Chepping Wycombe.**—September 22nd. Town Council. Supply and installation of a 160,000-g.p.h. centrifugal borehole pump and electric motor with control and switchgear, pipework, valves, etc. Borough water engineer's office, 70, Easton Street, High Wycombe, Bucks.

**Dewsbury.**—September 23rd. Corporation. Reactor and voltage regulator. (September 5th.)

**Howden.**—Rural District Council. Supply and erection of a borehole pump with alternative motor and Diesel engine drives. J. H. Haiste, consulting engineer, 22, Queen Square, Woodhouse Lane, Leeds, 2.

**Malvern.**—September 19th. Urban District Council. Electrical centrifugal pumping set to deliver 10,000 gallons of water per hour against a head of 420 ft. C. C. Judson, surveyor and water engineer, Council House, Malvern.

**Manchester.**—September 26th. Supplies of single, three-core and multicore cable. Mr. H. C. Lamb, engineer and manager, Electricity Department, Town Hall, Manchester, 2.

**Morley (Yorks).**—September 30th. Electricity Department. Change-over of two installations from single- to three-phase. Borough electrical engineer, Electricity Office, Morley.

**South Africa.**—SALISBURY (S. RHODESIA).—October 13th. City Council. Stoker-fired water-tube boilers and other power station plant. (August 29th.)

October 27th. Switchgear, transformers and reactors, together with auxiliary apparatus. (August 29th.)

DURBAN.—October 3rd. City Council. Overhead line material for trolley-bus operation (contract S.1972). 3/0 trolley wire (contract S.1973). Overhead line material for tramway operation (contract S.1975).

October 17th. Telephone cable (contract P.261). 72 transformers (contract E.2032).

POST OFFICE.—December 4th. Equipment for radio - telephone link between Maseru and Mokhotlong.

## Orders Placed

**Glasgow.**—Transport Committee. Accepted. Trolley switches.—British Insulated Cables, Ltd.

**New Zealand.**—PUBLIC WORKS DEPARTMENT. Accepted. 11-kV switchgear.—National Electrical & Engineering Co. 11-kV current limiting reactors.—Cory-Wright & Salmon, Ltd. 25-ton overhead crane.—A. D. Riley & Co. Electric furnace.—Birmingham Electric Furnaces, Ltd.

AUCKLAND ELECTRIC POWER BOARD. Accepted. 1,000 bracket insulators.—National Electrical & Engineering Co., Ltd.

**Newcastle-on-Tyne.**—City Council. Accepted Supply of 10 miles of copper trolley wire for the Transport Department.—White Cross Co., Ltd. (£1,220).

## Contracts in Prospect

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Bellingham (Northumberland).**—Conversion of Town Hall into cinema for J. A. Baty; Hetherington and Wilson, architects, County Chambers, Westgate Road, Newcastle-on-Tyne.

**Bishop Auckland.**—Two British Restaurants; U.D.C. surveyor.

**Blyth (Northumberland).**—Extension of canteens at three schools.—T. Wilson, borough engineer, Municipal Buildings, Blyth.

Rest centre and canteen; borough engineer.

**Brechin.**—Houses; borough surveyor.

**Bridgnorth.**—Hostel, Stourbridge Road; borough engineer, municipal offices.

**Bromsgrove.** — Pumping station, for East Worcestershire Waterworks Co.

**Bury.**—Adapting central hall at Tottington senior schools as cooking depot; borough engineer, Bank Street.

**Conisborough.**—Canteen at Cadeby; T. E. Haslam, secretary, Amalgamated Denaby Main Collieries, Ltd., Chesterfield.

**Coventry.**—Air-raid shelters (680) each to cost £360; D. E. E. Gibson, city architect, 1a, Warwick Row, Coventry.

**Croydon.**—Six cleansing stations; E. Taberner, town clerk, Town Hall.

**Darlington.**—British Restaurant; E. Minors, borough surveyor, Municipal Offices, Darlington.

**Dumbartonshire.**—Adaptations at eight schools for feeding centres (£1,625) with equipment (£1,700); county architect, Park Circus, Glasgow, C.3.

**Esher.**—British Restaurants at East Molesey, West Molesey, Cobham, and the Dittons, for U.D.C.; surveyor, Council offices, 1, High Street.

**Gateshead.**—Four additional British Restaurants; borough engineer.

**Glasgow.**—Offices; Campbells Downes & Co., Ltd.

Canteen; D. & W. Henderson, Ltd.

Office extensions; Barclay Curle & Co., Ltd.

Drawing office and rest room; Yarrow & Co., Ltd., South Street Buildings.

Store; Argus Foundry, Ltd.

**Gosforth (Northumberland).**—British Restaurant, South Cross Street for Urban District Council (£575); C. Wyld, surveyor.

**Hexham-on-Tyne.**—Canteen at Secondary School (£600); W. W. Tasker, county architect, Mitford Road Offices, Morpeth, Northumberland.

**Ilford.**—Canteen; Plessey Co., Ltd.

Two dormitory blocks, Seven Kings; L. E. J. Reynolds, borough engineer, Town Hall.

**Macclesfield.**—Adaptation of Park Green Schools for British Restaurant; M. Tetlow,

borough architect, Pear Tree House, Jordangate, Macclesfield.

**Manchester.**—Additions to dairy; Mayfair Sterilised Milk Co., Ltd., 13, West Street, Clayton, Manchester, 11.

Rebuilding flats, Collyhurst; J. Hughes, housing director, Town Hall, Albert Square, Manchester.

Dining hall; E. Butterworth & Co., Pollard Street, Manchester,4.

**Morley.**—Canteen at Gillroyd Wool Mills; secretary, J. Hartley & Sons, Ltd., Gillroyd Mills.

**Morpeth (Northumberland).**—A.R.P. store for County Council; J. W. Urpeth, contractor, Gibsons Buildings, Front Street, Bedlington, Northumberland.

**Northern Ireland.**—Cleansing stations at a hospital and at Brook Park; city surveyor's office, Guildhall Street.

**Norwich.**—Cleansing station, Sprowston, for Norfolk C.C.; county architect, 25, Thorpe Road, Norwich.

**Rhyl.**—Additional plant at pumping station, for U.D.C.; surveyor, Council offices, Clywdd Street, Rhyl, North Wales.

**Southend-on-Sea.** — British Restaurant, Hinguar Street Schools, Shoeburyness; R. G. Baxter, borough engineer, Municipal Buildings.

**Thurrock.**—Emergency feeding centre (2,000 persons) at South Ockenden, for U.D.C.; surveyor, Council offices, Whitehall Lane, Grays, Tilbury.

**Uttoxeter.**—Adaptation of premises for British Restaurant; S. S. Proud, surveyor, Town Hall, Uttoxeter, Staffs.

**Whitby.**—Adaptation of Church Street School as British Restaurant for the Urban District Council; Breckon Bros., builders, Whitby.

**Wiltshire.**—Hostel, Bryers Croft, for C.C.; T. Walker, county architect, County offices, Trowbridge.

**Yorkshire.**—Children's sanatorium at Thornton Lodge, Wensley Dale (£4,450), for North Riding C.C.; J. W. White, county architect, County Hall, Northallerton.

# Modern Fire Protection

## *Installation at a Generating Station*

THE following details describe an up-to-date fire protection system at a generating station. The station has transformer cubicles externally along its entire length, each protected by an independent Atlas "Oilfyre" equipment, on the unit control system. Two interconnected Atlas 155 deg. F. fusible controls are fitted close to ceiling level in each cubicle.

The fusible controls in each cubicle are fed by a common bus pipe, permanently charged with water from a main set of installation controlling valves, which are in turn fed by an electrically driven centrifugal pump, with a capacity of 1,000 g.p.m., delivery pressure 180 ft. at 75 BHP. The automatic operation of the pump, which is driven by a variable-speed motor at 230 V, DC, is brought about by means of a special diaphragm-controlled pressure switch connected to a totally enclosed contactor starter. A reduction of pressure in the system pipework, caused by fusing and operation of any control, is transferred to the pressure switch by a ¼-in. bore pipe connection. The lower pressure on the switch diaphragm causes the operation of the switch mechanism and the consequent starting of the pump motor. Though designed for automatic starting the contactor is arranged for manual stopping when it has been confirmed that the fire is extinguished. Water for the pump is taken from the culvert connected with the turbo cooling water system.

The protection of the four turbo-alternator oil lubricating and cooling systems is designed on somewhat different lines to suit the peculiar nature of the risk involved. Each turbo is, of course, fitted with its own protective system, in this case manually controlled by means of a separate stop valve on the branch from a second bus main which is taken through the engine room basement.

Both the high- and low-pressure oil systems of each turbo are protected by carefully placed "Atlas" projectors so arranged as not only to cover the whole length of the oil pipes, but also to give special protection to tee-pieces, flanges, branches, etc., where a split or fracture in the pipe is likely to occur. The oil system coolers are also included in the protection, as are the governor valves and governor gear on the engine-room floor.

The arrangement of the projectors, pipes and fittings, under the congested steam ends of the machines calls for careful work and special attention is given to this in the design stage. It should be noted that the controlling stop valve is located at the electrical end of the turbo set, remote from the governor gear and steam connections. Easy access to this position, which would be free of the fire zone, is maintained at all times. The alarm devices, which should always be complementary to the protective equipment, are both hydraulic and electrical in form. Pressure-operated diaphragm type circuit closers are fitted on the outlet pipes from each fusible control, and on the projector main beyond the controlling stop valve in the manually operated systems.

Each circuit closer is connected electrically to a specially provided indicator panel. Thus the flow of water, through the ½-in. connecting pipe, when a control fuses or when the turbo manual stop valve is opened, will operate the circuit closer to give an immediate alarm on the indicator. This unit is located in the control room, whereas the hydraulic alarm is fitted in the pump room or engine room and connected to the installation controlling valves. The hydraulic alarm is a specially designed Pelton wheel in a cast-iron case with a direct axial drive to a rotating hammer. In revolving, the hammer strikes a steel gong, to give a positive ringing alarm. The passage of water to the hydraulic alarm through the ½-in. pipe connection is governed either by the automatic tripping of the main controlling valves upon the opening of a control, or the manually-controlled turbo stop valves.